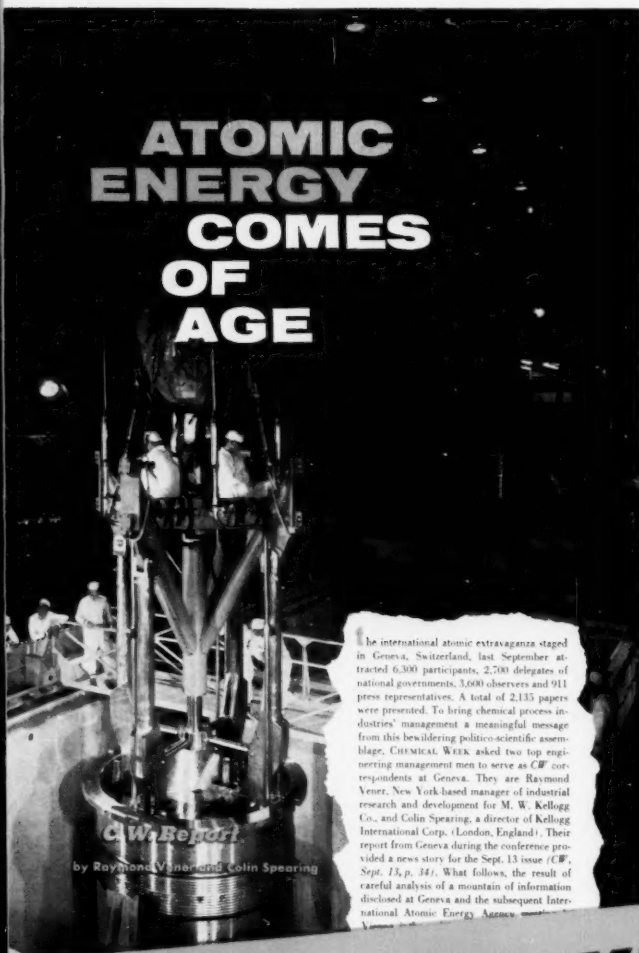


Chemical Week

ATOMIC ENERGY COMES OF AGE



CW Report
by Raymond V. Hancock and Colin Spearing

The international atomic extravaganza staged in Geneva, Switzerland, last September attracted 6,300 participants, 2,700 delegates of national governments, 3,600 observers and 911 press representatives. A total of 2,135 papers were presented. To bring chemical process industries' management a meaningful message from this bewildering politico-scientific assemblage, CHEMICAL WEEK asked two top engineering management men to serve as *CW* correspondents at Geneva. They are Raymond V. Hancock, New York-based manager of industrial research and development for M. W. Kellogg Co., and Colin Spearing, a director of Kellogg International Corp. (London, England). Their report from Geneva during the conference provided a news story for the Sept. 13 issue (*CW*, Sept. 13, p. 34). What follows, the result of careful analysis of a mountain of information disclosed at Geneva and the subsequent International Atomic Energy Agency...

Nylon-6 news: Du Pont plans 50-million-lbs./year caprolactam capacity p. 21

CPI slows capital spending despite optimistic outlook. McGraw-Hill survey . . p. 22

Production manager profile: His pay, his prospects, his potential p. 32

Benzene market won't balance before '63—still more capacity coming in p. 89

ATOMIC MARKET RIPENS

CW Report
Page 45

November 8, 1958

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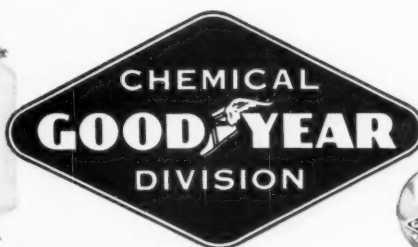
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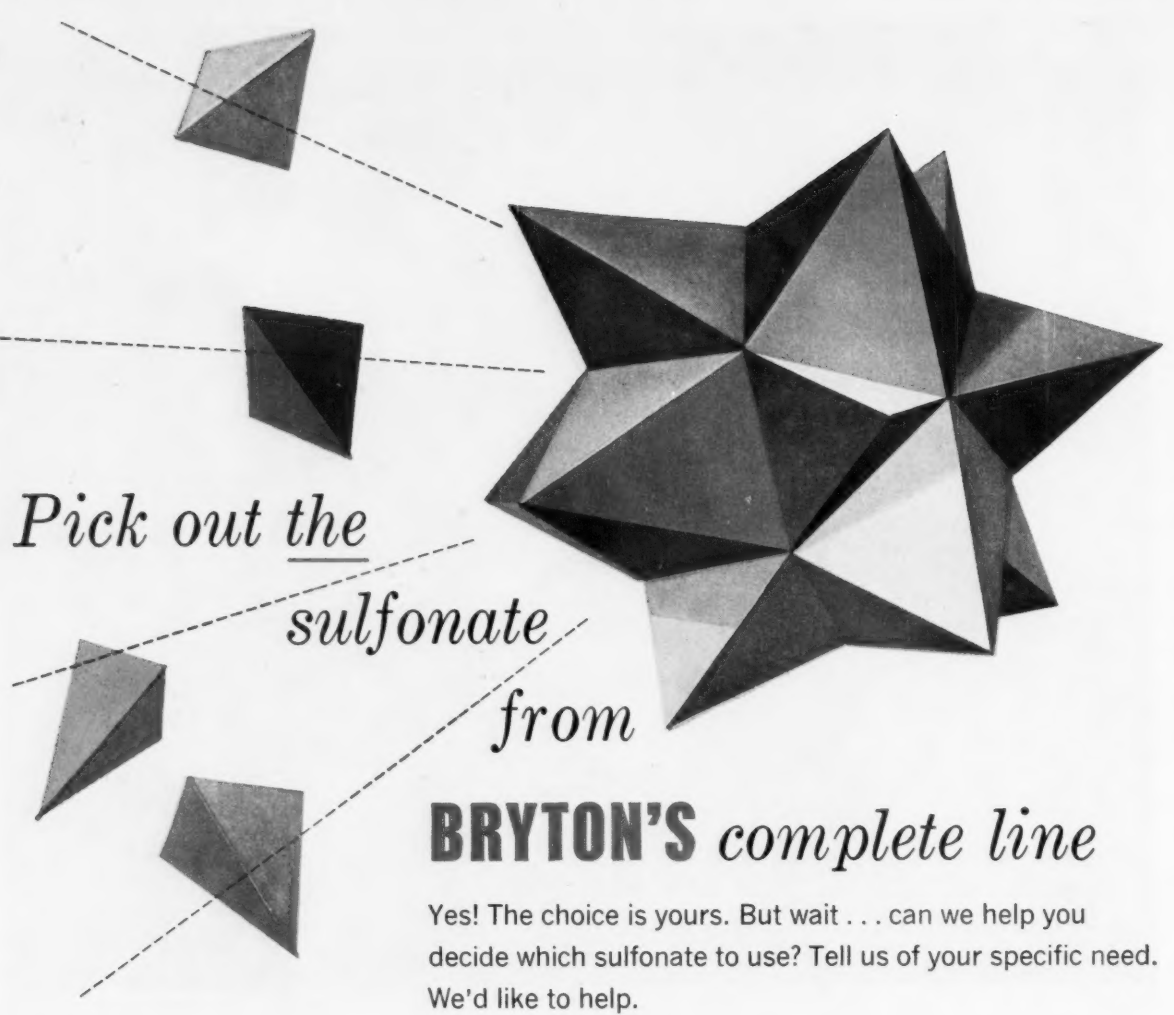
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Chemical Week • November 8, 1958

TOP OF THE WEEK

NOVEMBER 8, 1958

- ▶ **Du Pont jars caprolactam market, plans 50-million-lbs. year plant**
to be onstream by '60p. 21
- ▶ **Quick pictures of carloading** forestall damage claims against
chemical shippersp. 39
- ▶ **Solvent combination for extraction of uranium, vanadium** elimi-
nates precipitation-caused processing troublesp. 67
- ▶ **General Motors opens big new environmental testing station** in
Florida, will test synthetic fibers, plastics, paintsp. 79

10 VIEWPOINT

14 OPINION

14 MEETINGS

17 BUSINESS NEWSLETTER

- 21** Prospects are perking for nylon-6—
molding resins and fibers. Cost-
cutting caprolactam competition
now shaping up between Du Pont
and Allied.
- 22** Chemical management is harder
to sell on expansion products de-
spite rising optimism on sales, lat-
est survey of capital spending plans
reveals.
- 24** High-energy fuel news: boron and
fluorine plants go onstream; four
companies to seek new solid pro-
pellents.
- 24** Reichhold schedules expansions in
U.S. and abroad.
- 27 WASHINGTON NEWSLETTER**
- 32 PRODUCTION**
Take a look at the typical plant
manager, as shown by CW's survey
of the man and his job.
- 39 SALES**
Chemical shippers try boxcar
photos to cut damage claims.
- 40** Victor's recipe for monocalcium
phosphate promotion: recipe con-
tests.
- 45 CW REPORT**
Atomic energy comes of age—and

CPI figures strongly in its future
development.

59 SPECIALTIES

Machine-vending of specialties is on
the rise. Here are the pros and
cons.

67 ENGINEERING

Vanadium Corp. switches to new
solvent-extraction process for more
efficient recovery of uranium and
vanadium.

75 TECHNOLOGY NEWSLETTER

79 RESEARCH

General Motors' big new Florida
lab mass-tests paints, plastics, fab-
rics for resistance to weathering.

- 80** Nuclear magnetic resonance scores
new gains in revealing structure of
complex compounds.

85 MARKET NEWSLETTER

89 MARKETS

Overcapacity and imports plague
benzene marketers; balanced mar-
ket isn't likely before '63.

- 92** Red China: looming threat to U.S.
naval stores exporters.

95 ADMINISTRATION

"Give-and-take" of Rayonier con-
ference promotes better understand-
ing between U.S. and Latin Amer-
ican businessmen.

102 CHARTING BUSINESS

New encouragement for cosmetics
makers—teenage buyers grow in
number and per capita purchases.

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Vol. 83

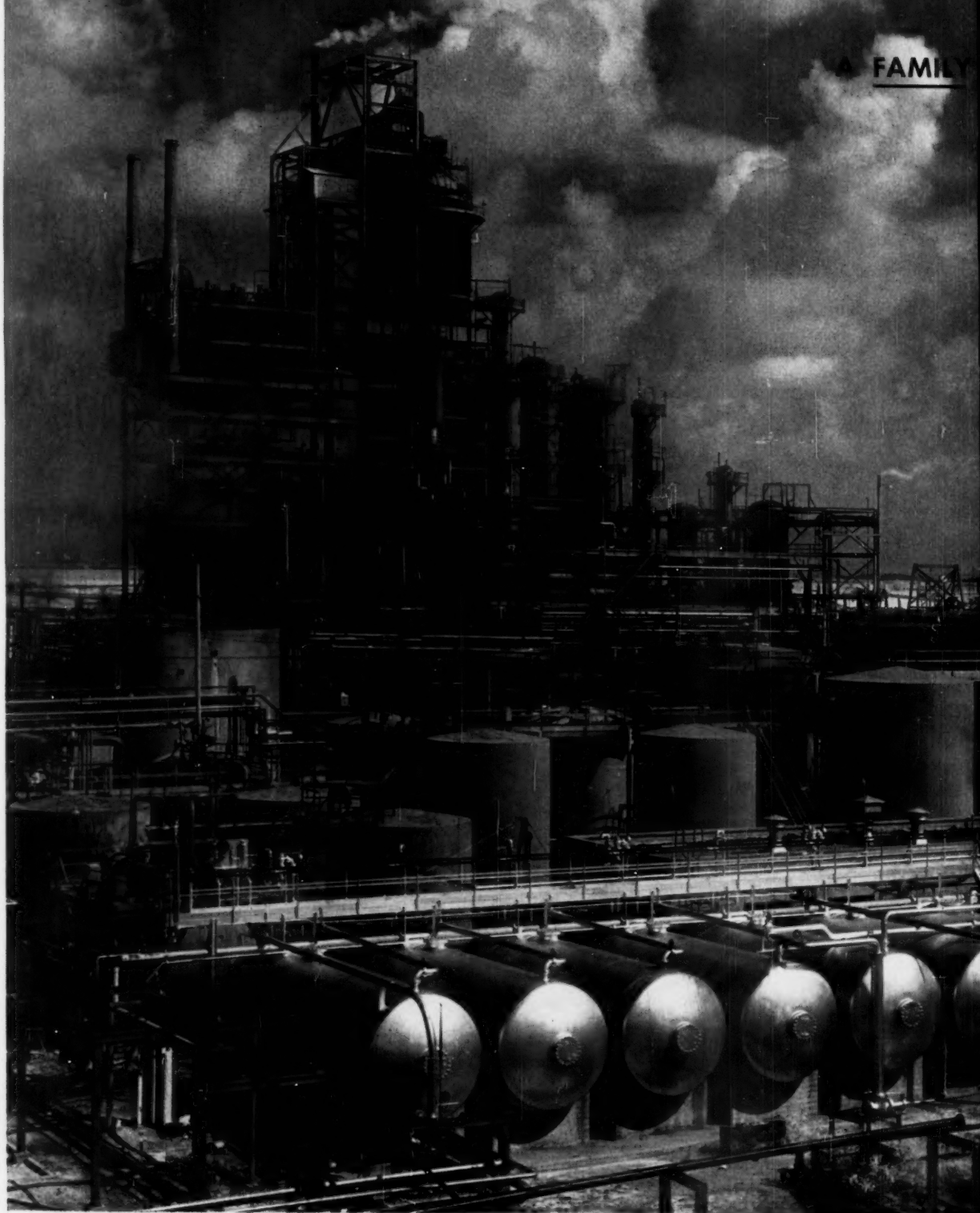
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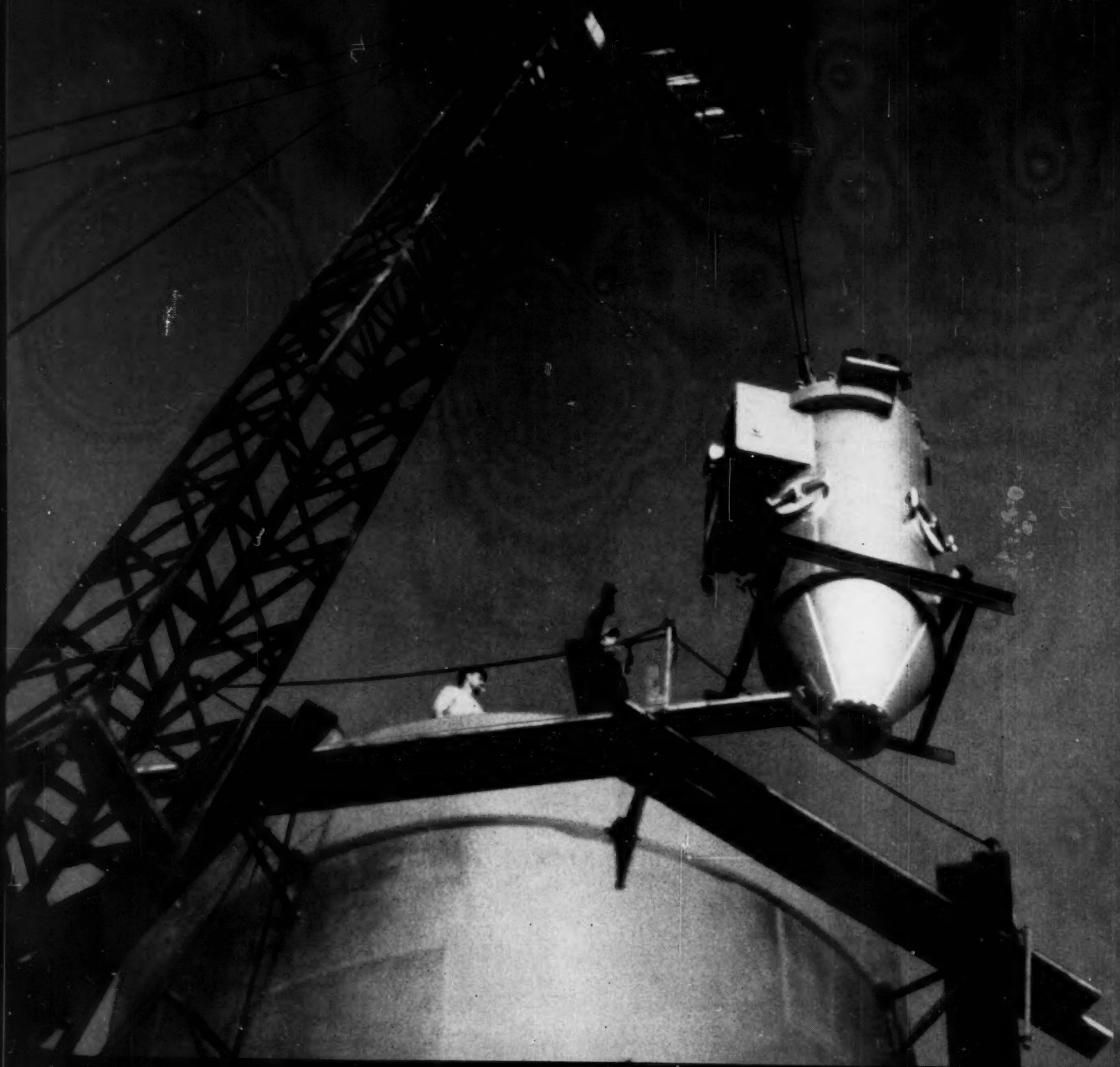


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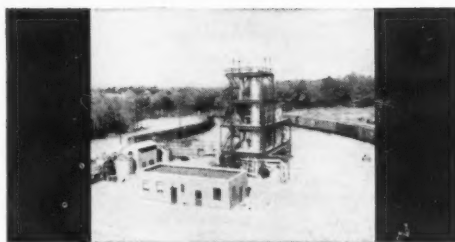
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THE BUSINESS MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

CRITICIZING government bureaucrats is easy. This week, on the other hand, we applaud the Defense Dept. for its award of those four solid-propellent research contracts (CW Business Newsletter, Nov. 1).

The pattern followed by the department's Advanced Research Projects Agency was this:

It held a meeting to explain the need for new solid-propellent systems. Representatives of 48 chemical process industries firms not currently involved in such research attended. John Kincaid, who heads ARPA's solid-propellent technology group, explained the unusual point about these government contracts for research: they would not be awarded primarily on the basis of the technical approach a company proposed. Instead, contracts would go to companies whose available scientific talent, management and facilities seemed likely to foster a "break-through" in technology.

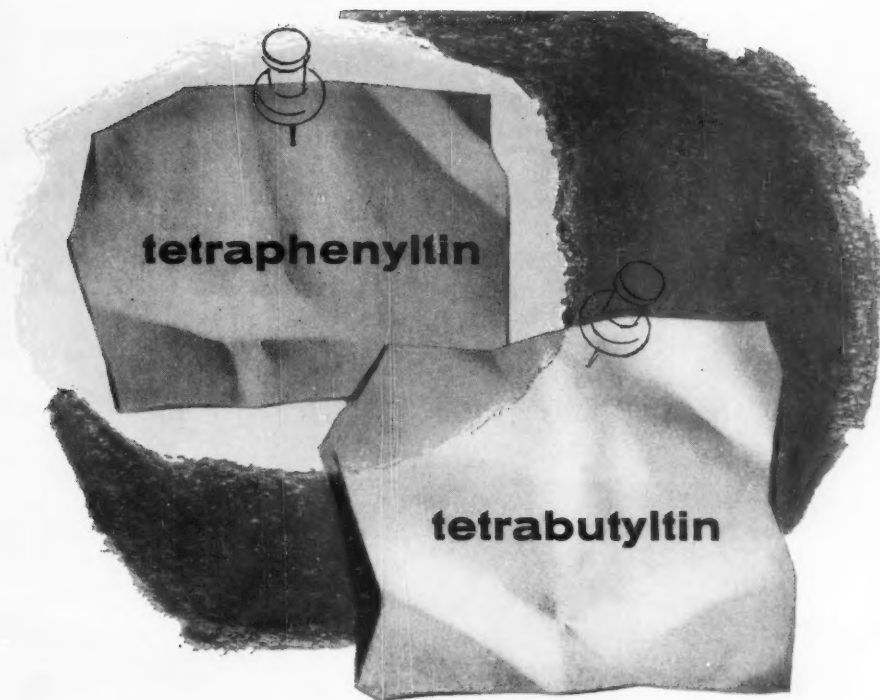
Following the meeting, 28 companies submitted proposals. Army, Navy and Air Force representatives screened these, selecting eight as most promising. ARPA officials then chose the final four.

The Interior Dept. is following a somewhat similar procedure on construction of a new helium plant. From a list of 80 prospective contractors, Interior chose eight as those best able to do the job—and meet a tight completion schedule. It's now negotiating with Fluor, at the top of the list. If a contract can't be agreed upon, the next firm on the list will get a chance.

Both of these are examples of good contracting procedures. If government procurement officers draw up strict, detailed specifications of what is to be done, contractors have little incentive for creating new approaches. But it's by encouraging such creativity that industry has made its past technological breakthroughs.

H.C. Johnson

Editor-in-Chief



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Highest commercial quality, available in tank cars, tank wagons, ton cylinders and 150-lb. cylinders.

CHLOROSULFONIC ACID

Iron less than 1.0 ppm as loaded. Water white. Delivered in glass-lined tank wagons, also in stainless steel drums.

SODIUM HYDROSULFITE

T-C HYDRO is a dry, white, free flowing, crystalline powder of uniform particle size and structure. It is dust free, assuring highest stability and uniformity.

PARA TOLUENE SULFONIC ACID, ANHYDROUS

Other organic Sulfonic Acids.

IRON

FERRIC IRON SULFATE

Partially hydrated, free flowing granular form. Available in bags or bulk.

ZINC

MONOHYDRATED ZINC SULFATE

36% Zinc as metallic. White, free flowing powder.

ZINC OXIDE

Secondary Zinc Oxide.

MANGANESE

MANGANESE SULFATE

Designed specifically for inclusion in mixed fertilizer.

MONOHYDRATED MANGANESE SULFATE

93% Mn, SO₄, H₂O. Highest purity, technical grade . . . NOT A BY-PRODUCT.

MANGANOUS OXIDE

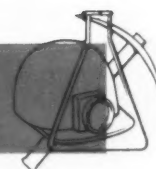
Minimum 48% Manganese as metallic. Feeds, fertilizers, spray or dust grades.

Samples, specifications and detailed information upon request.



TENNESSEE CORPORATION

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the stand-by
capacity to**

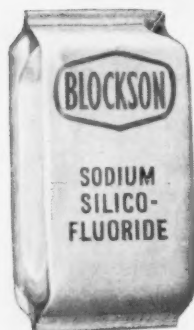
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SILICO-
FLUORIDE**
customers

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P.S. Include SSF with other Blockson chemicals in your mixed-car orders.



BLOCKSON CHEMICAL COMPANY

Division of Olin Mathieson
Chemical Corporation
Joliet, Illinois

OPINION

Are PA's Normal?

TO THE EDITOR: I see that Dow, after an extensive survey (*Oct. 11, p. 107*), concludes that there are strong indications that purchasing agents are highly normal individuals. In the light of the multitude of articles I've read in recent months concerning the peculiarities of PA's, their empathy requirements and their neuroses, at the very least I would have expected to find that they usually have two heads.

Why don't we forget the gobbledygook and realize that the purchasing agent is just a normal guy trying to do a good job—just like the chemist, the salesman, the accountant, the editor. He is just as interested in professional prestige, security, stature in his company, job satisfaction and financial reward as individuals in any other white-collar occupation—but no more so.

The best way to sell him is to help him to do a better job. Let's teach our salesman what a purchasing agent's job is, what his responsibilities are, and what the salesman and his company can do to help the PA do a better job—leave his psyche alone. . . .

V. L. PETERSEN

Manager, Chemical Purchasing
Goodyear Tire & Rubber Co.
Akron, O.

Crackproof Lacquer Hose

TO THE EDITOR: In your article on 1959 auto finishes (*Sept. 20, p. 63*) [you reported that] settling [of acrylic solids] was a major problem.

Another problem was that of environmental stress-cracking. Due to the fact that the lacquer and solvents were in constant circulation, any "weekend" hose failure meant loss of hundreds of gallons of lacquer.

As a major (70%) supplier of the plastic hose referred to, we initiated a crash program on a twofold basis. The first, to solve the immediate problem of starting the '59 models; and the long-range problem of supplying a fluid hose, which would not be subject to environmental stress cracking.

The initial hose supplied was our Dekoron "P," manufactured of high-molecular-weight polyethylene. On the long-term problem, field evaluations of

our Dekoron N2 Universal Fluid Hose (special polyamide formulation) indicate that the long-term answer has been solved. Dekoron N2 Universal Fluid Hose is now being produced in quantities for the '59 automotive year.

W. A. SWANSTON
Special Products Division
Samuel Moore & Co.
Mantua, O.

Getting Out and Politicking

TO THE EDITOR: . . . [Re your Viewpoint] (*Oct. 4.*), which I have read with a great deal of interest. I appreciate your endorsement of the position we have taken with respect to political affairs. . . .

ARCHIE D. GRAY
Senior Vice-President
Gulf Oil Corp.
Pittsburgh

MEETINGS

Atomic Industrial Forum, annual nuclear industry conference, Shoreham Hotel, Washington, D.C., Nov. 10-12.

Glass Container Manufacturers Institute, semiannual meeting, The Cloister Hotel, Sea Island, Ga., Nov. 10-13.

Chemical Market Research Assn., fall meeting; theme: adhesives; St. Paul Hotel, St. Paul, Minn., Nov. 12-13.

Commercial Chemical Development Assn., joint meeting with **National Agricultural Chemicals Assn.**, Lord Baltimore Hotel, Baltimore, Md., Nov. 20-21.

Society of the Plastics Industry, eighth national conference and exposition; theme: plastics for profits; Morrison Hotel and International Amphitheatre, Chicago, Nov. 17-21.

National Conference on Air Pollution sponsored by the U.S. Dept. of Health, Education & Welfare, Sheraton-Park Hotel, Washington, D.C., Nov. 18-20.

Manufacturing Chemists' Assn., semiannual meeting, Statler Hotel, New York, Nov. 25.

American Rocket Society, annual meeting, Statler Hotel, New York, Dec. 1-5.

American Institute of Chemical Engineers, annual meeting, Netherland Plaza Hotel, Cincinnati, Dec. 7-10.

American Nuclear Society, winter meeting, Sheraton-Cadillac Hotel, Detroit, Dec. 8-10.

Chemical Specialties Manufacturers Assn., annual meeting, Commodore Hotel, New York, Dec. 9-11.

SEVEN YEARS WITH THE RIGHT COATING

... And Still No
Corrosion Problems



Vinyl coatings based on BAKELITE Vinyl Resins for this tank were formulated by **Amercoat Corporation**, South Gate, Calif.

THE inside of this all-steel welded tank is protected with a coating based on BAKELITE Brand Vinyl Resins. Measuring 30 ft. high, 60 ft. in diameter, it was built for the city of South Gate, Calif., in 1951.

In 1955, city engineers inspected the tank and, according to the coating formulator, "the coating was in excellent condition." Some touching up was done where "holidays" had occurred in the original application.

This year, the tank was inspected again and "returned to service without any retouching whatsoever." Not only does this coating deter corrosion, it was also specified to be non-toxic and non-contaminating.

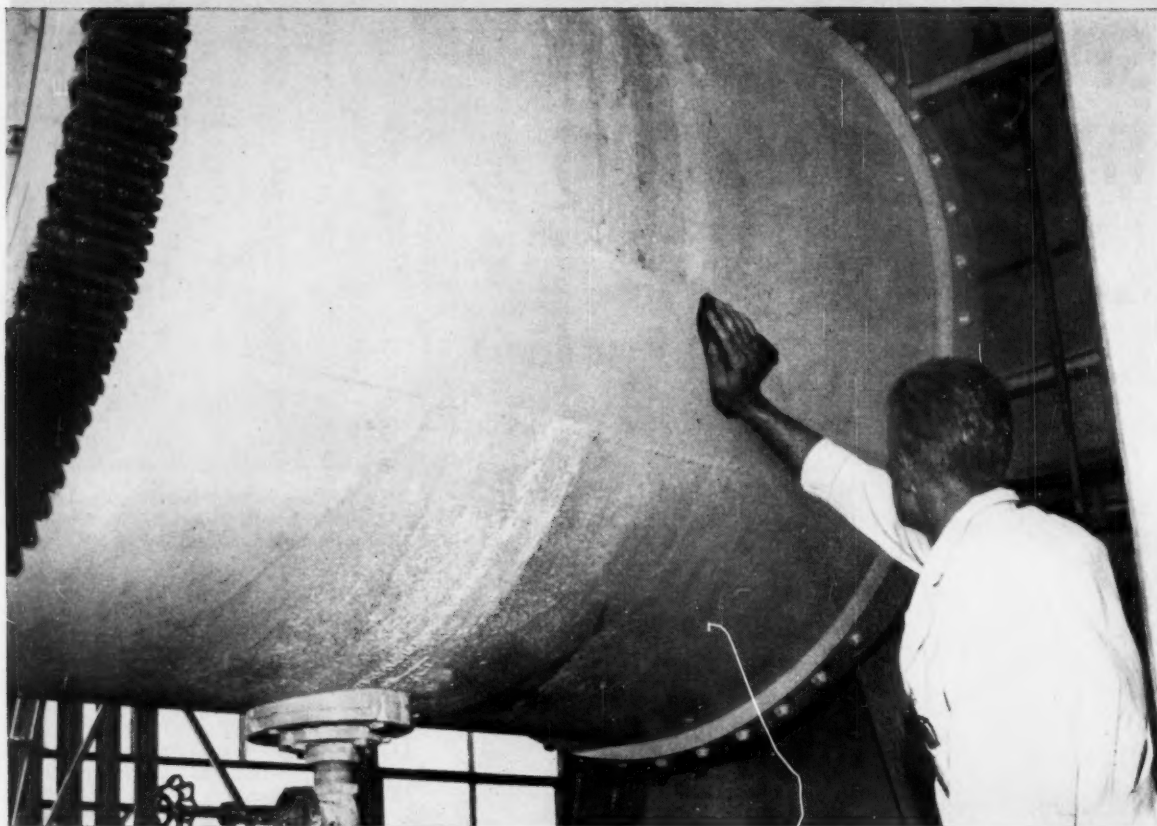
This story is typical of the low maintenance you can expect with protective coatings based on BAKELITE Brand Resins—for resistance to alkalis, acids, salt spray, industrial gases, wear and abrasion. Write Dept. KA-33L, Bakelite Company, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. In Canada: Bakelite Company, Division of Union Carbide Canada Limited, Toronto 7.

BAKELITE
BRAND
PLASTICS

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CARBIDE**

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At The Glidden Company...



At The Glidden Company, paint drippings from a pebble and steel ball mill are easily cleaned off the Epon resin-based exterior surface coating with a solvent-dipped rag.

Chemical-resistant Epon[®] resin-based coatings guard paint production equipment from corrosion ... greatly reduce maintenance costs

At one of the paint production plants of The Glidden Company, enamel coatings on equipment were often stripped down to bare metal in only 30 days by the corrosive action of caustic cleaners. Maintenance costs were high.

To reduce costs for general housekeeping and repainting, the grinding mills, storage tanks, structural steel, and concrete areas were coated with Glidden's own

Epon resin-based paint, Nu-Pon Cote.

Even though the Epon resin-based coatings are constantly exposed to hot caustic soda solutions, solvents, paint splashes, and abrasion, a fast washing down with solutions of petroleum and ester solvents keeps them clean and bright. Equipment is completely free from corrosion. *The Epon resin-based coatings have already lasted 4 times longer than the previous enamels.*

Most paint users are already aware of the many advantages offered by Epon resin formulations . . . excellent adhesion, resistance to abrasion, impact, heat, and humidity extremes.

Your Shell Chemical representative will explain how you can take full advantage of Epon resins in your paint and enamel formulations. Write for EPON RESIN ESTERS FOR SURFACE COATINGS.

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Business Newsletter

CHEMICAL WEEK
November 8, 1958

What are the most promising opportunities in the CPI right now?

The moves of several companies this week show where they think best chances lie.

Pennsalt Chemicals figures its areas of highest future potential embrace high-energy chemicals, refrigerants and aerosol propellents, rubber chemicals, organic sulfur compounds, and organic ammonia products.

And of these, Pennsalt—whose long-range growth program is made up of a series of five-year plans, one of which will begin Jan. 1—believes its best prospect for near-future profits are the chlorofluorohydrocarbons, already in production at two plants near Calvert City, Ky. Consumption of these products, whose chief use is as refrigerants and aerosol propellents, increased from 60 million lbs. in '55 to 141 million in '57; and an additional 50% increase is expected by '62.

Company Treasurer W. Cooper Willits, speaking late last week before Los Angeles securities analysts, noted that Pennsalt's research and development budget is now more than 60% higher than in '55. He again denied—vigorously—that there have been any merger talks with Victor Chemical Works.

Pittsburgh Plate Glass, on the other hand, sees shining prospects in barium chemicals. Effective Nov. 17, PPG will acquire all assets of Barium Reduction Corp. (South Charleston, W. Va.). PPG subsidiary Columbia-Southern Chemical Corp. will manage the barium operation. Barium Reduction is using a fluid-bed calcining process (converting barium carbonate into the oxide) that was licensed from Columbia-Southern. Owners of Barium Reduction stock will receive an undisclosed number of PPG shares.

For Oil Shale Corp., the rainbow leads to its Aspeco process for extracting hydrocarbons—including retort gases that could be used as feedstock for petrochemical production—from Colorado oil shale (*CW*, July 19, p. 102). This concern—which has already spent more than \$700,000 for acquisition and development of the process—is now planning to offer about \$580,000 worth of common stock and convertible debentures to finance further research and development work. The company hopes to ultimately make “favorable licensing arrangements with domestic oil, chemical or mining companies” for use of the thermosphere process.

Three new developments cheer titanium producers this week.

Du Pont has leased about 3,000 acres of ilmenite-bearing land in west Tennessee; Metal & Thermit will modernize its \$1.3-million titanium plant near Montpelier, Va.; and National Distillers expects its new titanium unit in Ashtabula, O., to start paying off by the end of this year.

Business Newsletter

(Continued)

The new Du Pont property consists of 2,500 acres near Lexington, Tenn., and 450 acres near Camden, Tenn., which is directly across the river from New Johnsonville, where a now-abuilding Du Pont plant will produce titanium dioxide for pigments. Company officials stress that the new land is strictly for exploration purposes.

Disagreements are snagging proposals for tariff cuts for the U.S. and Europe, now being negotiated in two major conferences. At the GATT meeting in Geneva, U.S. delegates are pressing the Germans to lower their import restrictions; the U.S. itself is under fire for its import quotas. The proposed round of 20% tariff cuts will have to wait until '60, when the European "common market" tariffs are set. In Paris, meanwhile, progress toward a European free-trade area is almost stalled by dissension.

Latest earnings statements signal more third-quarter gains.

Heyden Newport's third-period sales hit \$12.5 million, up 5.7% over the June quarter and 6.8% higher than '57's third quarter. In the nine months, however, earnings slumped 45% and sales were off 4%.

Spencer Chemical's third-period sales were \$12 million, compared with \$10.7 million a year ago. Earnings: \$720,000, down 14%.

General Aniline & Film upped sales in the quarter to \$35.9 million vs. \$35.1 million last year. But after-tax net totaled \$1.5 million, compared with \$1.6 million in '57.

Celanese boosted third-quarter sales to \$59.8 million, up 19% over last year. Earnings shot ahead to \$4.4 million, compared with \$2.9 million in '57.

Food Machinery and Chemical, reporting the best third quarter in its history, rang up sales of \$84.4 million and profits of \$4.2 million—up 11% and 34%, respectively, over last year's totals.

Pennsalt's third-quarter earnings topped \$1 million, a whopping 62% better than the same period last year. Sales hit \$20.8 million, up 1%.

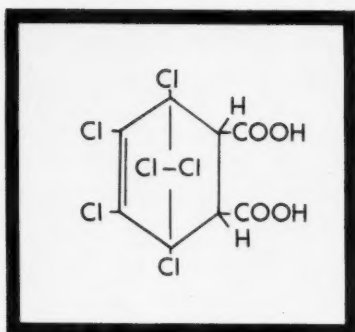
Merck chalked up sales of \$52.4 million in the third quarter, compared with \$47.2 million in '57. Earnings totaled \$7.1 million vs. \$5.9 million last year.

Commercial Solvents upped sales in the September quarter to \$18.3 million, a gain of 4%. Profits hit \$321,605, up 38.8%.

It's a new foreign venture for global-minded Merck & Co. This week, Merck and Tata Sons, a leading Indian industrialist, are launching a \$4.2-million company to produce vitamin B₁₂, steroids and other pharmaceuticals in India, starting in mid-'59. Merck's interest: 60%.

BRIEFS

on a highly chlorinated new intermediate... some phosphorus chemicals for igniting... new booklet on benzoic acid and sodium benzoate... an exhaustive chlorine manual



New intermediate is 54.7% stable chlorine

This is Het® Acid, also known as chlorendic acid. It is a versatile intermediate which undergoes typical dibasic acid reaction.

It's 99.5% pure in the form of fine, white crystals. The stable, high chlorine content makes it exceptionally useful for imparting flame retardance to various derivatives.

Forms salts with a variety of metals. Both mono- and di- sodium salts are easily formed.

Forms esters by the usual methods to produce dimethyl, diethyl, dipropyl, etc. Rate of esterification is quite rapid.

Forms anhydride by dehydration at high temperatures.

Forms amines and amides.

Forms resins with glycols and other polyols and with fatty oils to make flame-retardant oil-modified alkyds.

These are just a few of Het Acid's reactions which have commercial interest. For a cursory glance at the whole story send the coupon for technical data sheet or, if you'd like to go into this even deeper, send for our Bulletin 40.

Some things have to burn

Got a product you want to ignite in air—like a firecracker, or a match, or a fuse, or a signal flare?

We make two different chemicals that will help get it started: red phosphorus and phosphorus sesqui-



sulfide.

The red phosphorus is 99.4% pure and ignites in air at 200°C. The particle size is 99% min through 100 mesh.

The phosphorus sesquisulfide is a lemon yellow compound completely free of untrapped phosphorus. It ignites by friction. 90% goes through an 80 mesh screen. 80% goes through 100 mesh.

Technical data on both compounds offered in the coupon.

New booklet on benzoic acid and sodium benzoate



If you would like facts on these two chemical cousins in one compact little booklet, check the coupon for Bulletin 323.

It's chock full of useful data on both Hooker chemicals in both their

U. S. P. and Technical Grades.

Free Chlorine manual

If you'd like 76 pages of facts on chlorine, send the coupon for Bulletin 125.

There's a lot of information on the chemical itself, including charts and graphs on its physical properties.

There's lots more on how to handle chlorine safely. Descriptions of equipment and containers should make it easier to run a safe chlorine handling program.

Finally, there is a listing of the advantages you enjoy as a user of Hooker chlorine. Dependable delivery, in scrupulously clean containers, is the important one. But there are many others.



For more information check here and mail with your name, title, company, and address.

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| <input type="checkbox"/> Het Acid, Technical Data Sheet | <input type="checkbox"/> Phosphorus Sesquisulfide |
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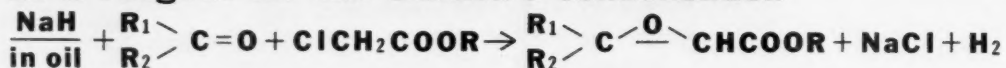
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GLYCIDYL ESTER SYNTHESIS NEWS

MHI SODIUM HYDRIDE IN OIL offers new advantages as a reagent for the Darzen's condensation



The glycidyl esters, now useful as perfume and flavor ingredients, hold promise of a bright future in vinyl plasticizers and stabilizers, and in resin intermediates. Synthesis of these esters, through Darzen's condensation, now can be simplified with better yields obtained in shorter reaction times at room temperature, with little or no side reaction. The key to this advancement is *MHI sodium hydride in oil* which is used as the condensation reagent, together with a ketone and a chloroacetate acid ester. While other bases for this reaction, such as Na, NaOR, and NaNH₂, have been used and reported, (1), (2), the *MHI sodium hydride in oil* technique is the newest and most interesting development to date.

MHI research indicates that many ketones can be successfully condensed with NaH in oil and ethyl chloroacetate.

A few are: acetone, acetophenone, cyclohexanone, mesityl oxide, methyl isobutyl ketone.

Handled as a solid, MHI NaH in Oil is a 50% dispersion of 2-25 micron particle size crystals in an inert white mineral oil. It can be mechanically or hand fed directly into reaction vessels. Highly reactive, safe to handle, convenient to use, MHI NaH in Oil also has profitable application as a condensing agent for Claisen, Dieckmann, Stobbe, nitrile and related ester condensations and alkylations.

REFERENCES: 1. Newman, M. S. & Magerlein, B. J.; Organic Reactions V pp. 413-429 Wiley & Son (1947)
2. Ballester, M. Chemical Reviews 55, pp. 283-299 (1955)

For complete information concerning MHI NaH in Oil or for samples of this useful industrial chemical, write:



Metal Hydrides Incorporated

PIONEERS IN HYDROGEN COMPOUNDS

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Caprolactam Lineup

	Capacity	Due
ALLIED CHEMICAL		
at Hopewell, Va.	60 million lbs./year	Jan. 1, 1959
COMMERCIAL SOLVENTS		
at Peoria, Ill.	? million lbs./year	Early 1959
OHIO RIVER CHEMICAL		
at Ashland, Ky.	20 million lbs./year	Early 1960

*DUPONT
at Beaumont, Tex.
50 million lbs./year
late 1960*

Add a Heavyweight to Caprolactam Roster

As reverberations of Du Pont's surprise entry into caprolactam rumble through the chemical process industries this week, management men are still trying to gauge the move's future effect on nylon makers and their competitors. Most agree the impact of a major new nylon-6 monomer source won't be gentle.

Du Pont broke the news last week that its Explosives Dept. will build a 50-million-lbs./year caprolactam plant at Beaumont, Tex. Construction is set to start early next year, and the plant should go onstream in the third quarter of '60.

Allied now has the biggest stake in the caprolactam business. National Aniline Division's caprolactam unit at Hopewell, Va., is being expanded to over 60 million lbs. capacity, will be onstream by Jan. 1—several months

ahead of schedule. This plant alone will put caprolactam supply far ahead of demand for the next few years.

Cost of the Du Pont material may provide another headache. Allied has been selling dry caprolactam for 60¢/lb.; the solution for 57¢. Du Pont says its prices will be "considerably below" present levels—below 50¢/lb., it tells CW. How far below will depend on production capabilities.

Allied will move fast to meet the impending competition. "Caprolactam prices can be expected to come down in early '59," says Allied. The company also states that it intends to meet any other producer's prices.

But Allied may find the race a hard one, some believe, because of higher raw-materials costs. Allied's caprolactam process starts with phenol;

Du Pont starts with cyclohexane, which is some 7¢/lb. cheaper. Allied does have the advantage of a captive source of phenol; Du Pont will buy its starting material, probably from Phillips or Shell.

If its plan works, Du Pont will be the first company to commercially achieve the cyclohexane route, long sought by several European and U.S. companies. Allied says it could have taken the cyclohexane route, claims its process costs in any case won't surpass Du Pont's. Coproduct of Du Pont's plant will be cyclohexylamine, while Allied's yields ammonium sulfate as a by-product.

Second Thoughts: Du Pont's entry into caprolactam had been anticipated by Spencer Chemical and Industrial Rayon, which last summer formed Ohio River Chemical Co. to build a

20-million-lbs./year caprolactam plant. Output would have been largely for captive use. Spencer recently reported that construction has been held up pending further marketing and technical studies (*CW*, Nov. 1, p. 23). It now admits the delay was prompted by Du Pont's plans. The Ohio River Chemical venture, it says, is still "active." But the betting is that Spencer and Industrial Rayon will "buy instead of build," taking advantage of the expected price cuts.

Commercial Solvents, another prospective caprolactam producer, says it is going ahead with installation of small-scale production equipment.

Building for the Future: Even if the Ohio River Chemical project were abandoned and Commercial Solvents' caprolactam operations remained small, Allied and Du Pont would still face large overcapacity during the next several years. Allied acknowledges that—when its expanded facilities come onstream this winter—capacity will "considerably" outrun demand. It's looking to the future.

But few agree on just what the future for nylon and caprolactam will be. Predicts Du Pont: "We believe the market for caprolactam for producing Type 6 fiber and molding powder will reach about 110 million lbs./year within the next 10 years." Du Pont's figure is equal to the total capacity of its own and Allied's plants.

Market estimates for nylon and caprolactam vary widely. One major producer believes that total nylon-6 consumption this year will be 3 million lbs. for plastic, 25 million for fiber, and that in '60 some 8-10 million lbs. of nylon-6 will go into plastics, 40 million lbs. into fiber. Another estimate: in '60, 20 million lbs. of nylon-6 for plastic, 60 million for fiber; in '63, 40-50 million lbs. for plastic, 90-100 million lbs. for fiber. And one enthusiast—a nylon-6 producer—believes Type 6 molding powders may rack up sales of 75-80 million lbs. in '63.

Assuming that it takes 1.1 lbs. of monomer to make 1 lb. of polymer, caprolactam has a prospective market of 55-88 million lbs. in '60, 165 million lbs. or more in '63.

Most of these estimates would leave the U.S. caprolactam cup overflowing for a long time to come. But part of the overflow may be drained off by exports. Allied has been importing

caprolactam to help fulfill its contracts with customers.

Caprolactam has reportedly been in short supply in Europe, and American producers will probably be able to meet, or better, prices there.

Push from Prices? Much of the optimism expressed by the nylon industry springs from producers' belief that a lowering of prices would open up new markets. To some extent, this is undoubtedly true. But many of nylon's projected markets would probably not be strongly affected by moderate price changes. Particularly in its molded forms, nylon's special properties, not its price, will win sales.

But in some areas, lower price might open new doors. Foster Grant believes extruded nylon film would compete with present wrapping and laminating materials—e.g., Mylar—if the price comes down as expected.

Tire-cord sales would probably also react to a price cut. Already nylon producers contend their tire-cord is competitive in price with rayon tire-cord. Allied, now the only nylon-6 tire-cord producer, hopes that—if the monomer price is cut—other nylon-6 producers will be encouraged to get into the tire-cord field. But rayon cord makers, waging a highly energetic campaign to hold their markets, regard nylon-6/6 as a far greater competitive threat, for technological reasons.

Cousins at Odds: Among their most formidable rivals, nylon-6 producers count Chemstrand and Du Pont, sole producers of nylon-6/6, which has dominated the U.S. nylon scene. Because of this competition, a National Aniline executive says he is "pleased" that Du Pont is going into caprolactam, that the move means a healthy outlook for nylon-6.

But in becoming a supplier for its competitors, Du Pont implies confidence that its nylon-6/6 (based on hexamethylenediamine) and nylon-6/10 (which starts with sebacic acid) will meet the nylon-6 competition in price and properties. For fibers, the company plans to stick exclusively with 6/6. And only a small fraction of its caprolactam output will go to the Polychemicals Dept. for molding powder. Its standard 6/6 molding resin outsells its 6 and 6/10 powders. While the nylon resins are all becoming increasingly specialized, the 6 and 6/6 resins compete for many of the same markets.

Still Whittling

A more hard-boiled attitude toward expansion projects is prevailing in most chemical process industries, despite optimism that the current upturn in sales volume will continue into '59 and beyond.

Other findings of the just completed McGraw-Hill survey of capital spending planned by U. S. business: Outlays for new plant and equipment on the part of all business are heading up; but present plans do not indicate an early return to the peak level of '57. Sales are expected to rise even more sharply; in manufacturing as a whole, '59 sales may regain the '57 level.

Makers of chemicals and allied products have been paring their expansion budgets since last spring, even though sales have been climbing steadily from last winter's trough. In April, companies in this group reported they were planning to invest nearly \$1.6 billion in new plant and equipment this year, \$1.35 billion during '59, another \$1.35 billion during '60. As of last month, those anticipated expenditures had been whittled down to \$1.4 billion this year, \$1.29 billion next year, and \$1.21 billion in '60 (*chart*, p. 23).

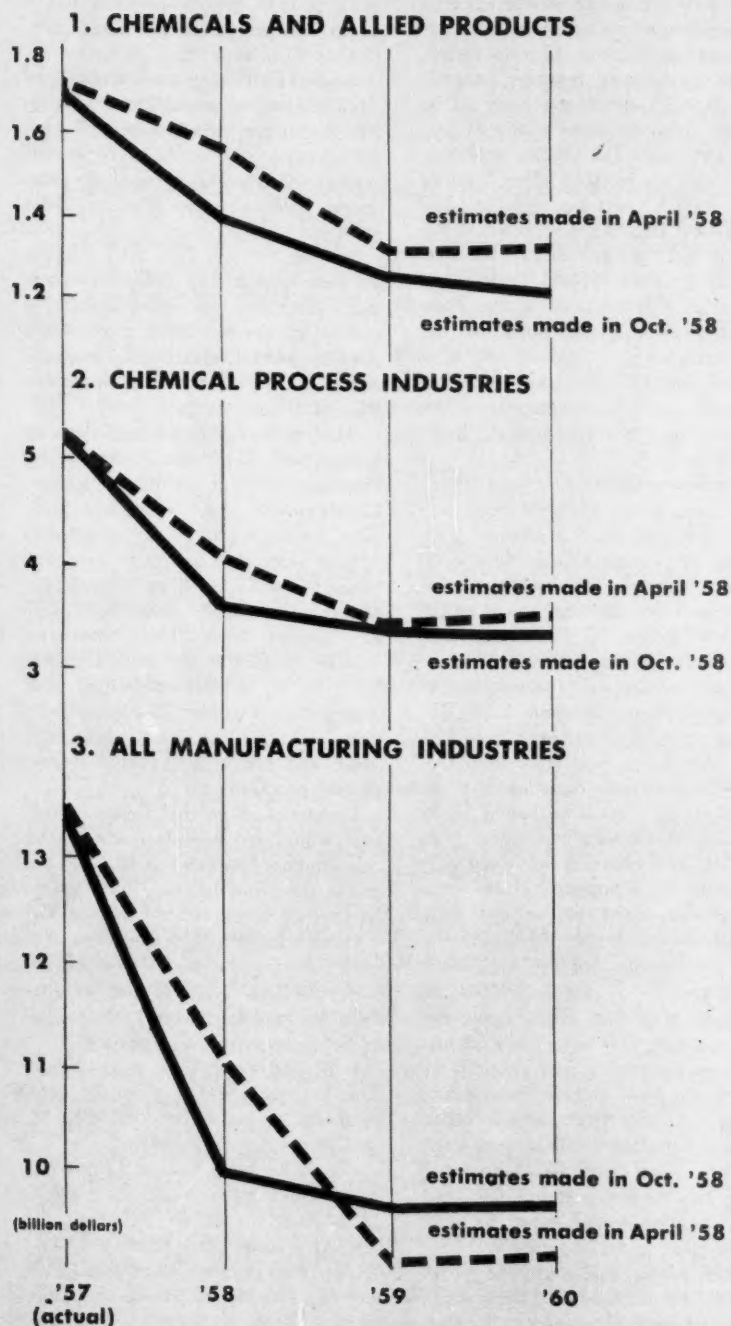
Greater Conservatism: Among process industries, even greater conservatism is being displayed by petroleum refining companies. From April to October, they slashed their capital budgets by about one-fifth: '58, down 21.1%; '59, down 20.2%; '60, down 17.1%. Rubber companies also became more selective about expansion projects during the past six months, lopping 20.9% off their '58 program, 14.7% from '59 plans, 10.7% from '60's budget.

Most bullish within the CPI are the pulp and paper companies (*CW Business Newsletter*, Nov. 1). Notwithstanding current overcapacity in their industry, they have been boosting their capital spending programs by about one-quarter. Between April and October, they raised their capital budgets for this year 14.2%; for '59, 27.8%; for '60, 33.8%.

Two other process industries have been adjusting their capital spending plans both ways. Most mercurial: the primary nonferrous metals industry, in which capital expenditures for this year were cut 18.6%; for '59, were

Down CPI Expansion Budgets

Today: More Cautious Mood on Capital Spending



beefed up 17.4%; and for '60, were trimmed 3.3%. Makers of stone, clay and glass products whacked 18.1% off this year's budgets, but added 4.9% and 1.3% to their '59 and '60 budgets, respectively.

Chemical Spending High: Although companies producing chemicals and allied products have trimmed their '58-'59-'60 capital expenditure programs substantially below the '57 peak of \$1,724 million, their proposed budgets for '58-'60 are highest among manufacturing industries in each of the three years.

The two next-highest-ranking manufacturing industries—machinery makers and iron and steel producers—have substantially raised their sights on capital spending for the next two years. Last April, the iron and steel companies expected to spend \$733 million in '59 and \$748 million in '60; now their capital budgets for each of those two years total \$1,043 million.

The upsurge in optimism since last winter has led three big nonmanufacturing groups—petroleum, transportation and communication, and commercial—to increase their '59 capital expenditures to aggregates higher than their totals for this year. Utility and mining companies also have revised their '59 and '60 budgets upward since last April, but not up to this year's levels.

Sales Upswing Expected: All manufacturing industries are expecting to sell more goods next year than during '58; average increase anticipated in physical volume of sales is 9%. In three of the CPI groups, the outlook is somewhat more favorable: companies producing cement, clay and glass and those producing rubber products are looking for an 11% upswing, and makers of chemicals and allied products foresee a 10% rise over this year's shipments. In other CPI branches, the expectations are more modest: pulp and paper, up 7%; nonferrous metals, up 5%; and petroleum refining, up 4%.

Over-all, preliminary plans for '59 now call for only a slight increase over capital spending this year, and plans for '60 are about the same as those for '59. But previous experience indicates that these preliminary plans will be further increased as profits and cash flow increase and as the time comes to complete expansion and modernization programs.

Flareup in HE Fuel Activity

Things are popping fast in high-energy fuels this week.

- Callery Chemical is opening the Navy's big new boron fuel plant at Muskogee, Okla.

- Four major chemical companies are readying million-dollar research efforts to pack more energy into solid rocket propellents.

- Allied Chemical is starting full-scale production of liquid fluorine—theoretically the most efficient oxidizer for rocket fuels—at new facilities in Metropolis, Ill.

Startup of Allied's new fluorine unit is first step in the company's plans to produce uranium hexafluoride for the U. S. atomic energy program in 1959. Most of the fluorine output is slated for a uranium hexafluoride plant now under construction, and due for completion next year. But Allied stresses that there's enough fluorine capacity to produce tonnage quantities for rockets and missiles.

Moreover, Allied has solved the tricky handling problem that formerly kept fluorine's full potential from being realized. Allied ships and stores it as a liquid rather than as a gas. The fluorine containers on special refrigerated tank trucks are nested in a second tank chilled with liquid nitrogen. This system may well spark the widespread use of the highly reactive fluorine in rockets and missiles.

Contracts Granted: In another new development last week, the Defense Dept.'s Advanced Research Projects Agency decided to grant solid-fuel research contracts to Dow Chemical, Esso Research & Engineering, Minnesota Mining & Manufacturing and Cyanamid (see also *Viewpoint*, p. 10). Purpose: to work on "radically new" solid propellents "needed for getting a significant improvement in performance over the most advanced solid rocket fuels we know."

ARPA has authorized the military services to begin contract negotiations at once on cost estimates, reporting procedures and the like. Accordingly, the Army is negotiating with Esso, the Air Force with Dow, and the Navy with 3M and Cyanamid.

Individual contracts range from \$1 million to \$2 million for the first year's research. And there's a chance they will be renewed.

Dearth of Details: Direction of the propellant development is still pretty much under wraps. But industry observers report that 3M's basic fluorine patents signal at least one approach that company will take.

There's speculation that 3M could develop a Teflon-like binder material that could also act as an oxidizer because of its reactive fluorine atoms. A 3M spokesman, however, emphasizes that it's much too early to be specific about its possible approaches.

In any case, 3M reports it should have "an appreciable effort" under way—though perhaps not in full swing—by Dec. 1. Research will be carried out at its central research labs in St. Paul, Minn. Testing and evaluation will be done at the New Brighton arsenal, just north of the city.

Dow will likely try to develop a material containing magnesium as its contribution to fast-burning, high-energy fuels.

Experience Cited: American Cyanamid's research and production experience in explosives is credited with helping its chances to become one of ARPA's choices. The company says it will carry out fuel research at either its Bound Brook, N. J., or Stamford, Conn., laboratories.

Esso's all-around know-how in petroleum chemicals, plus Esso Research and Engineering President Eger Murphree's experience as a Defense Dept. missiles czar, added to its qualifications. Esso's work will be in its main laboratories at Linden, N.J.

In all, 28 companies submitted proposals to the Pentagon. These were screened to eight before the final selections were made. Pentagon officials describe the bidding as "highly competitive."

Others May Bid: Right now, the Pentagon isn't sure how much further it will go to sponsor new research in solid rocket fuels. But the assumption is that in the near future other chemical companies will get a chance to bid on basic development projects.

"Zip fuel" is the nickname for what Callery will be producing at the \$38-million plant in Oklahoma.

These boron fuels will be used primarily for military jet planes, such as the highly regarded chemical

bomber (*CW Technology Newsletter*, March 1).

Tonnage production of the new liquid fuel will begin next year.

More Plants, Profits

Within the past five weeks, Reichhold Chemicals, Inc. (White Plains, N.Y.) has launched six expansion projects in a growth program keyed to its climbing sales and earnings.

Late last week, the company reported nine-month net earnings of \$2.1 million, up more than 2% from the first three quarters of '57 (not including profits on sales of investments). As previously reported, nine-month sales were up 8%, to \$54.4 million.

In '58 through '60, RCI expects to spend about \$18 million on new plant facilities—more than double the outlays of the preceding three years. And the annual research and development budget has been increased \$400,000.

This week, Reichhold was planning a new plant in France — its second expansion in that country this year. Location will be at Niort, and principal product will be formaldehyde.

Last week, the company disclosed plans for a \$4.5-million phenol unit to be added to its diversified plant at Tacoma, Wash. This capacity—initially 30 million lbs./year, ultimately to be 60 million—combined with Reichhold's existing 70-million-lbs./year plant at Tuscaloosa, Ala., will make RCI one of the world's largest phenol producers.

Construction of the Tacoma project—which will include research and development facilities—is slated to begin in the latter half of 1959 and to be finished in the second half of '60.

Other Reichhold expansions revealed during the past five weeks:

- At Hong Kong, a plant to produce RCI's line of synthetic resins, to be onstream by next spring.

- At Houston, Tex., a \$1-million unit to make alkyd, polyester and emulsion resins, to be completed by next summer.

- At Elizabeth, N.J., a \$5-million, 30-million-lbs./year phthalic anhydride plant, to be in by next fall.

- At Kansas City, Kan., a \$500,000 plant to produce 30 million lbs./year of formaldehyde, to be onstream by next April.

COMPANIES

Upjohn Co. stockholders, at a special meeting Nov. 21, will vote on a plan to change the state of incorporation of the company from Michigan to Delaware and to exchange each outstanding share of Upjohn stock for 25 shares in the Delaware corporation.

It's expected that several Upjohn shareholders, in the first public offering of Upjohn stock, will sell some of their holdings through New York underwriters Morgan Stanley & Co.

United States Rubber Co., on Dec. 1, will reopen its plant in Milan, Tenn., to make 8 million lbs./year of "camelback" for retreading tires.

Atlantic Chemical Corp. (Passaic, N.J.) will purchase a controlling interest in Macromol Corp. (Matawan, N.J.). Macromol produces macromolecular chemicals and polystyrene resins. Atlantic makes dyestuffs, pigments and organic intermediates.

A. O. Smith Corp. (Milwaukee, Wis.) is purchasing, for an undisclosed amount of cash, all the assets of Erie Meter Systems Inc. (Erie, Pa.), maker of pumps for petroleum products. Smith manufactures automobile frames, water heaters and a diversified line of chemical processing equipment.

The Glidden Co. is offering for public sale \$30 million in 4¾% sinking fund debentures, due Nov. 1, 1983. Price: 99%. Yield: 4.82%.

Proceeds will help repay \$15 million in outstanding bank loans, \$6 million in serial notes, with the remainder to be added to working capital reserves.

EXPANSION

Pulp and Paper: Tennessee River Pulp & Paper Co. has optioned 1,100 acres of land in Counce, Tenn., where it will build a 500-tons/day kraft papermill. Construction is slated to get under way next March 1. Cost: \$40 million.

Tennessee Governor Buford Ellington has pledged a use-tax exemption for the new unit through support of legislation that would lift all but the first \$25,000 of use-tax payment from big new industrial ventures.

Ellington also promised the papermill a bridge across Pickwick Dam, subject to approval by the U.S. Bureau of Public Roads.

Natural Gas Extraction: Runnels Gas Products Corp. and Texas Gas Exploration Corp. are blueprinting a \$500,000 expansion and modernization project for a jointly owned gasoline extraction plant in Eunice, La. Engineering work is already under way. When completed next April, the plant will process another 69 million cu.ft./day of natural gas for extracting natural gasoline,

commercial butane and propane, bringing total capacity to 369 million cu. ft./day. Contractor is The Fluor Corp. (Los Angeles).

Adhesives: H. B. Fuller Co. (St. Paul, Minn.) has established a branch plant in Winnipeg, Man., to manufacture all types of dextrine, starch, animal and resin adhesives. Investment was not revealed.

Wood Preserving: Dixie Wood Preserving Co. (Dearing, Ga.) is building a \$40,000 plant in Pine Bluff, Ark., to produce chemically treated lumber for use in general construction. The company will treat pine lumber to make it impervious to insect and rot damage.

Petrochemicals: New England Gas & Electric Assn. (Cambridge, Mass.) may diversify into production of petrochemicals. Tentative plans are to build a plant on land to be purchased from its subsidiary, New Bedford Gas & Edison Light Co. (New Bedford, Mass.). The new unit would use natural gas supplied by the New Bedford firm, extract such chemicals as butadiene, propylene and tars.

The company has petitioned the State Public Utilities Commission for permission to build the plant. And other negotiations, though not yet firm, are well advanced.

FOREIGN

Enamels/France: Farbenfabrik Bayer AG. (Leverkusen, Germany) will establish an enamel smelting works in Collonges-Aumontdor, near Lyon, France. The plant will be operated by a new company, Societe Des Emaux Vitrifies (Sodevi), which was founded jointly by Bayer and an unidentified French group. The new firm is capitalized at 60 million francs. Operations will start in the spring of '59.

Methanol/Brazil: Borden Chemical Co. has appointed John V. Lynn, a former executive of The Fluor Corp., to manage its new 30-tons/day methanol plant near Cubatao, Brazil. The \$3.5-million methanol plant, Brazil's first, is scheduled to start up in December.

Synthetic Fiber/Taiwan: China Artificial Fiber Corp. is starting construction of a new viscose staple unit supplementing its viscose filament production.

Output of the plant will be 10 million lbs./year. Machinery and know-how are being supplied by Von Kohorn International Corp. (White Plains, N.Y.), which is now increasing its investment in the Taiwan venture.

Phenol/Luxemburg: S. A. Cockerill-Cougree will not reopen its Luxemburg phenol plant before '60. The decision is reportedly due to the low price level in West Germany, which has been the principal market for the plant's output.



HOW J&L PIGMENTED PHENOLIC LININGS "Eliminate product spoilage for Niagara Chemical"

"Container corrosion has been eliminated by switching to J&L lined containers," reports Niagara Chemical Division of Food Machinery and Chemical Corporation. "The problem of product contamination, a common one when packaging liquid insecticides, fungicides and herbicides, has been solved by using these J&L trip-tested containers."

Extensive laboratory and "in transportation" tests conclusively prove that J&L tight-head drums and pails, lined with pigmented phenolic linings, are ideal containers for these specific products. They resist the corrosion properties of these acidic compounds.

Nine J&L container plants located near all major chemical and petroleum producing areas provide fast, round-the-corner service. J&L lined containers—over 2,500,000 in 1957—have carried thousands of chemical products safely to their destinations.

It will pay you to call in a J&L container specialist to discuss lining problems. Simply call the J&L Container Division, 405 Lexington Ave., New York (YU 6-6600); or call a J&L branch office at Atlanta; Bayonne, N. J.; Boston; Chicago; Cleveland; Kansas City, Kansas; Lancaster, Pa.; New Orleans; Philadelphia; Pittsburgh; Port Arthur; and Toledo.



Jones & Laughlin Steel Corporation

CONTAINER DIVISION

405 LEXINGTON AVENUE, NEW YORK 17, NEW YORK

Washington Newsletter

CHEMICAL WEEK
November 8, 1958

A Senate drug price probe is in the works. Sen. Estes Kefauver's antitrust and monopoly subcommittee staffers are preparing what could be a much broadened sequel to the Federal Trade Commission study of antibiotic manufacturing.

There has been no decision to hold public hearings. But with Kefauver's backing, the subcommittee is expected to give the go-ahead, probably at its organizational meeting in February. Hearings would come within months.

Meanwhile, staff investigators are boning up on the drug industry. Using FTC's data, they will be delving further into such things as the relationship between drug prices and profits, and the rigidity of prices of patented goods.

Such drug price investigation—guided by a staff that includes many former FTC lawyers and economists—would form a part of Kefauver's continuing investigation into "administered prices." The theory is that in an industry with few producers, prices are set and held with little regard to demand.

•
Latest moves in the Du Pont antitrust case, which will influence the decision on what Du Pont must do with its 63 million shares of General Motors stock:

Federal Judge Walter La Buy is expected to rule before Nov. 17 on a Justice Dept. request that Du Pont be temporarily enjoined from using any influence on General Motors, until a decision is reached on whether Du Pont must actually get rid of its GM stock.

The government last September asked La Buy for immediate injunctions to prevent continued voting of GM stock by Du Pont, against further increases in Du Pont's stockholdings in GM, and against continued participation in GM affairs by any Du Pont directors or employees.

Judge La Buy took the government's request under advisement last week, at another of a series of preliminary conferences. These are being held to work out procedures for the forthcoming hearing on what relief is necessary to comply with last year's Supreme Court ruling. The court said Du Pont's stock ownership in GM violates the antitrust laws. Lawyers expect Judge La Buy to rule on the injunction request before the next preliminary conference, set for Nov. 17.

La Buy is expected to decide at that time whether to set Jan. 26 as the date to begin the formal hearing on the divestiture issue, as suggested by government lawyers.

•
The paint industry is counting up its new orders, since it got the Administration and Congress to shut the Navy's two huge paint manu-

Washington Newsletter

(Continued)

facturing factories this year. The industry has lined up \$5 million worth of procurement contracts since the last Navy plant closed June 30—and figures it will do an \$8-million/year business in ship paints once the Navy uses up its remaining stocks. Originally, the Navy made all its own paints.

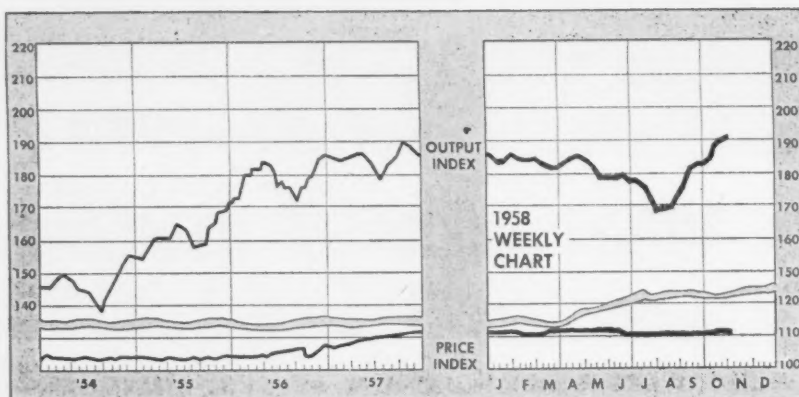
Another paint industry plus: The Air Force has decided to buy fluorescent paints for use in attempting to prevent air collisions. Some 13,000 military planes are to be painted with daylight-fluorescent paints between now and the end of this year.

The U.S. will get more foreign metals and minerals by bartering domestic crop surpluses overseas. This program has been virtually shelved since the spring of '57, when the Agriculture Dept. required export-import brokers to submit proof that their barter deals were not replacing normal commercial sales of crops.

Now the department won't require brokers to prove so exhaustively that barter transactions are "additional" to normal dollar sales.

Lead and zinc will be on the new "shopping list." Foreign pressure for inclusion of these metals is strong, particularly from Mexico and Peru.

First new barter deal will be a swap of 400,000 tons of surplus U.S. wheat for 150,000 tons of Indian manganese ore and 75,000 tons of ferromanganese alloys.



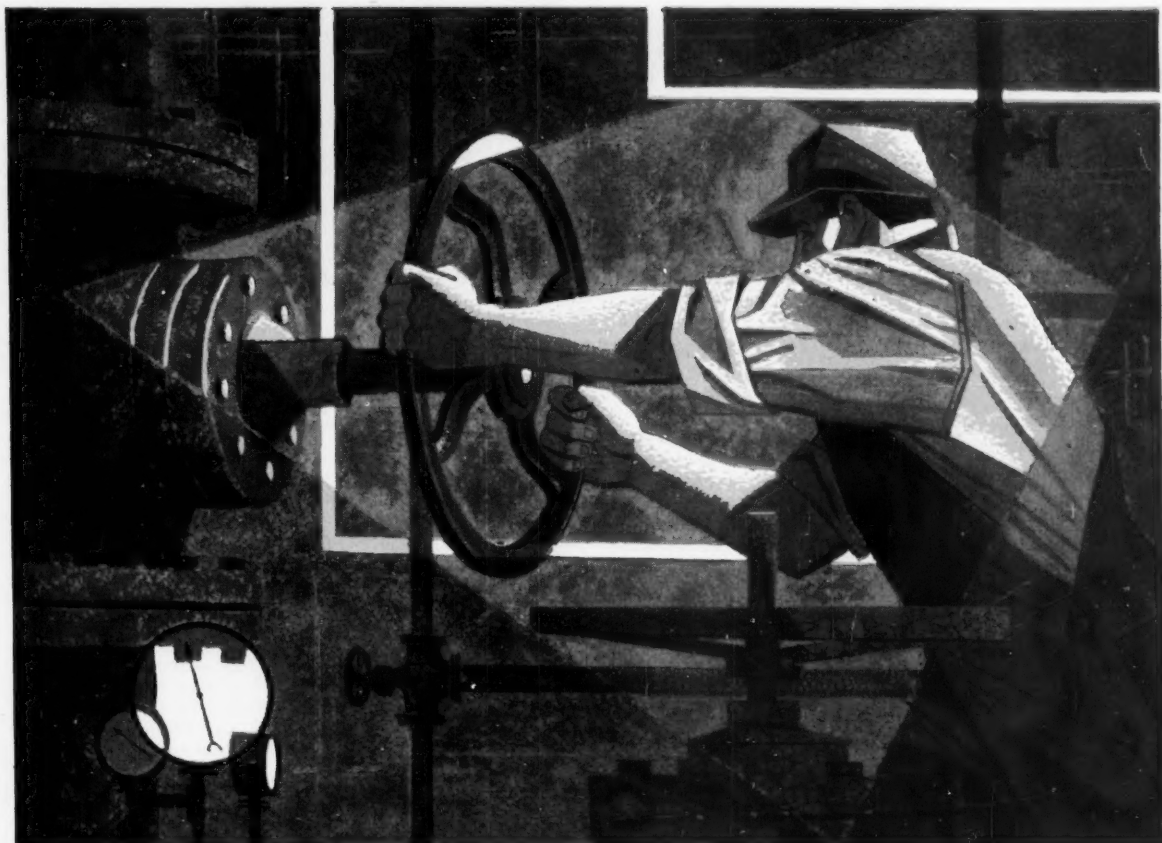
Business Indicators

WEEKLY

	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1947-49=100)	191.0	190.3	190.5
Chemical Week wholesale price index (1947=100)	110.5	110.9	111.0
Stock price index of 11 chemical companies (Standard & Poor's Corp.)	45.49	46.17	39.22

MONTHLY

Trade (million dollars)	Manufacturers' Sales			Manufacturers' Inventories		
	Latest Month	Preceding Month	Year Ago	Latest Month	Preceding Month	Year Ago
All manufacturing	26,394	26,284	28,638	49,453	49,777	54,203
Chemicals and allied products	1,998	1,979	2,008	3,737	3,722	3,737
Petroleum and coal products	2,802	2,806	2,920	3,303	3,314	3,517



Improved NEVILLE 2-50-W Hi-Flash* Solvent brings you better finishes at lower cost

Neville's 2-50-W Hi-Flash Solvent has always been characterized as a superior, fully refined, water-white naphtha with a slow evaporation rate, good odor, high flash point and excellent solvency power. *Now, through improved control techniques, the solvency strength has been increased with no change in the product's low cost.*

And beyond solvency power, 2-50-W offers a number of other advantages to the manufacturer of alkyd finishes, aluminum paints, marine

* Trade Name

finishes, varnishes and enamels. It leaves no gummy residue to soften a finish, aids adhesion, hardens uniformly, and improves brushing, flowing and leveling characteristics. It aids in promoting surface tension control when used in aluminum paints, thereby promoting better leafing and leaf retention. 2-50-W is available for quick delivery in drums, transports or tank cars. For further information or a sample, please write to Neville Chemical Company.



NEVILLE

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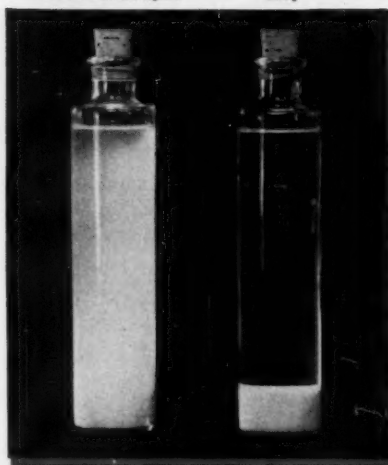
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NC 32 CW

Surface Modified
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CaCO₃



***New Organophilic ASP's . . . surface modified
aluminum silicate pigments designed for organic service**

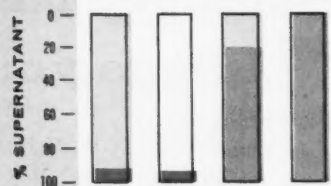
Now the superior performance exhibited by ASP's in aqueous systems is available for organic systems. M & C-developed methods bring a new line of aluminum silicate pigments which are *organophilic* with "hydrophobic" properties—they take to organic liquids but shun water. The Surface Modified ASP's offer these advantages: (1) excellent suspension, (2) improved flow, (3) little emulsification, (4) fast dispersion, (5) easy wetting. This performance is due in part to the ability of these *new ASP's* to resist physical adsorption of water during storage, resistance to changes brought about by the presence of small amounts of water in organic systems, and on affinity exhibited for them by organic systems. Put aluminum silicate pigments to work in *your* products. This is a *starred item* . . . check and send in the coupon.

Superiority of Surface Modified ASP's shown in unretouched photograph of settling test. Equal amounts of Surface Modified ASP and precipitated CaCO₃ were added to mineral spirits, bottles shaken and picture taken 30 minutes later.

**Better, Low-Cost Suspending Agent—
new Attagel® 20**

Serving equally well in both organic and aqueous systems as suspending, emulsifying or thickening agents, new Attagel 20 is a colloidal grade of attapulgite. Attagel 20 disperses to an average particle size of less than 0.1 micron—in organic systems directly with use of a surfactant, in aqueous systems by application of high shear. The illustration shows the suspending characteristics and low material costs for new Attagel 20. In this evaluation the system was a red oxide-titanium dioxide pigment ground in a medium oil alkyd and reduced with mineral spirits. Pigment and oil percentages were kept constant: 13.50 red oxide, 1.50 TiO₂, and 10.00 alkyd (50% NVM). 100 ml of each sample was allowed to settle for 96 hours. The gradations in the graph denote appearance at end of the settling period—(white is clear liquid). Ratio of Attagel 20 to surfactant was 3:1—however, the optimum ratios for other pigment combinations can vary and should be determined for each formulation. If you use emulsifying, thickening, or suspending agents—for organic or aqueous systems—you too can benefit from *new* Attagel 20. Investigate . . . check and mail the coupon.

**Settling Time . . . Material Costs of
Attagel 20 Formulations**



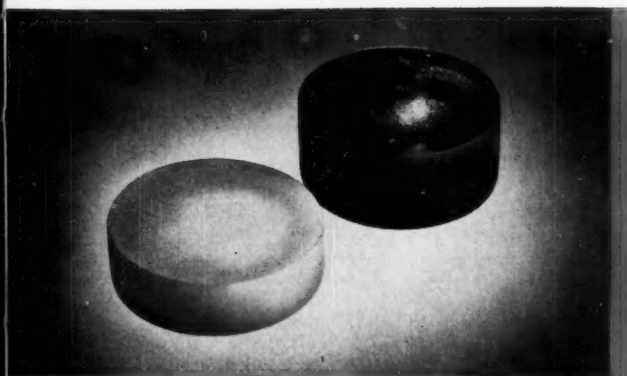
Attagel 20, %	0.00	1.00	2.50	5.00
Surfactant, %	0.00	0.33	0.83	1.70
Mineral Spirits, %	75.00	73.67	71.56	68.30
Pigment-Oil, %	25.00	25.00	25.00	25.00
Raw Materials, approx. cents/lb.	7.0	7.2	7.6	7.9



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*Wax Refining—POROCEL adsorbent assures superiority of wax products

POROCEL, activated bauxite, is the stellar performer in wax refining, with its unique selective adsorptivity producing paraffin and high melting point micro-waxes which are six-ways superior: (1) water-white, (2) odorless, (3) tasteless, (4) oxidation-resistant, (5) low-acidity, (6) stable in demulsibility. For refining there's now a choice of traditional static-bed percolation equipment and M & C's new patented *continuous percolation process*. In both processes, POROCEL adsorbent gives *performance unexcelled* for refining waxes, lube oils, and specialty oils such as turbine and electrical insulating oils. This item is *starred* on the coupon . . . check it.

Development Engineers: are you looking at the pattern for a better product?

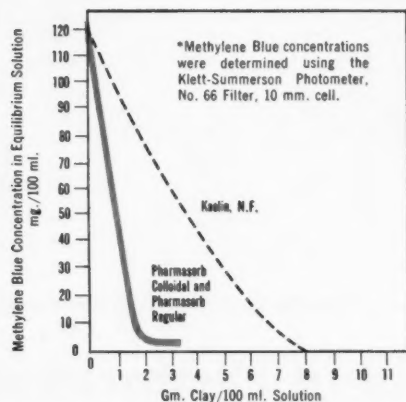
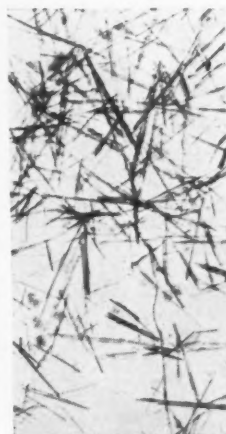
The illustration shows at 35,000 magnification the needle-like structure of attapulgite. Imagination in application is putting M & C's Attapulugus Clays processed from attapulgite into new uses by capitalizing on their chemical inertness and special physical characteristics:

high surface area . . . adsorbs, desiccates, catalyzes, buffers colloidal . . . gels, imparts thixotropy, emulsifies, binds, suspends

high liquid adsorption

low bulk density

"Imaginapplication" of these properties led Attapulugus Clays into such diverse jobs as carriers for liquids, dispersing small quantities uniformly through large masses of solids or dispensing easily as solids; binding foundry sands; cleaning floors—and furs; thermal insulation; absorbing moisture in solids to shorten drying cycles; and high temperature mastic sealing . . . jobs now performed better than before and like-as-not at less cost—thanks to the properties built-in by nature. Look into the possibilities for improving *your* products with the Attapulugus Clays . . . use the coupon.



Adsorption of Methylene Blue from aqueous solution (120 mg./100 ml.) by Pharmasorbs and Kaolin, N.F.*

R: Evaluate Pharmasorbs' high adsorption capacity in pharmaceutical preparations

The Pharmasorbs are M & C Research's newest development. They originate in attapulgite which is selectively mined, then processed and activated for pharmaceutical use in two grades—Regular and Colloidal. Their high adsorptive powers are demonstrated in the graph. Other studies indicate the potential of the Pharmasorbs in formulating intestinal adsorbent preparations for treatment of enteric conditions . . . five to eight times the adsorptive capacity of kaolin for the alkaloids strychnine, atropine and quinine . . . five times superior to kaolin as adsorbent for diphtheria toxin . . . marked superiority over kaolin in adsorbing *staphylococcus aureus*. This high adsorptivity also suggests application of the Pharmasorbs to development of purification procedures and to acid neutralization. Perhaps these *new* adsorbents, in these or other jobs, can be *your* way to new, better preparations . . . evaluate them . . . send the coupon.

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- ✓ what you need to get tests started . . . we'll fill your requests immediately.

For more data, see your *Chemical Materials Catalog*, pages 358-362

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 * ☐ Attapulugus Clays
 * Please send, without obligation:
 * ☐ data; ☐ samples; ☐ prices; ☐ technical representative
 * name _____
 * title _____
 * company _____
 * address _____
 * city _____ zone _____ state _____

PRODUCTION



THE AVERAGE PLANT MANAGER

Salary: \$15,000

Bonus: \$1,700

Plant size: 100-500 employees

Age: 45

Years in CPI: 21

Years with company: 16

Years in production: 15

Years in present position: under 5

A composite picture of the average chemical plant manager funnels a wide range of data into one view

Survey Facts and Figures Fill in Features of

Take a look at today's typical plant manager in the chemical process industries (above). He's 45 years old, has spent 16 years with his company, earns about \$15,000/year, and chances are a little better than 50-50 that he gets a bonus—the average one is \$1,700/year. This profile emerges from CW's just-completed survey of scores of plant managers throughout the country.

This latest study is similar to one CW made five years ago. And, as the earlier survey showed, plant size is probably the factor most affecting salary—although age, experience in the process industries, tenure with

the company and time spent in production also have some bearing on the amount of salary received.

Plant Size Predominates: In '53, three categories of plant size were studied: under 100 employees, 100-500, over 500. Corresponding salary averages were \$11,000, \$14,000 and \$21,000. This year, averages for the same plant sizes are \$12,000, \$16,000 and over \$20,000, indicating a general salary rise of 9-14% in the past five years.

This year, by breaking down the plant-size categories further, CW found even stronger evidence of the plant-size-to-wage relationship. Plants

were grouped by number of employees: under 20, 20-50, 50-100, 100-500, 500-1,000, and over 1,000. The average for each of these groups progresses by \$2,000 intervals from one size to the next (average for the smallest size being under \$10,000, for the next size \$10,000-12,000, etc., to the largest size, which averages well over \$18,000).

Over-all, plant manager salary average is \$15,000; 21% make between \$14,000-16,000. But 12% are earning below \$10,000, and 11% more than \$24,000.

The average plant has 100-500 employees (42% of the plants sur-

\$18,000

How Salary Increases with Plant Size

\$16,000

\$14,000

\$12,000

\$10,000

Annual Salary

under 20

20-50

50-100

100-500

500-1,000

over 1,000

Number of Employees

Salary correlates most closely with plant size, although age and experience are also related.

Chemical Industry's Average Plant Manager

veyed are in this range). The smallest plants studied, with under 20 employees, make up 5% of the total, while 10% have over 1,000.

Age Is a Factor: Ages of the managers vary widely, with 10% under 35 and 11% over 55. But the average is 45, with a little over a quarter of the total in their early 40s. Although the '53 survey showed no correlation between age and salary, such a relationship appears to turn up this year, particularly in the lower age brackets. A few high salaries pull the average wage of the youngest group (under 35) to \$11,000, although most are under \$10,

000. The next three five-year-interval age groups average \$13,000, \$16,000 and \$17,000, respectively. However, the 50-55 group shows a drop to \$15,000 average; the 55-60 bracket spurts to \$21,000 and the over-60 group averages \$19,000.

Concisely, a two-group analysis of age-wage relationship shows that over two-thirds of those under 40 make less than \$14,000, while two-thirds of those over 50 make more than \$14,000. Also, none of the managers surveyed who are under 40 have reached the \$20,000 level.

Experience Counts Some: The number of years a manager has spent

in the CPI, with his company or in the production function, also shows a slight correlation with his salary, although not as much as do plant size or age. Average time in the industry is 21 years. Of the 8% who have been in the CPI for under 10 years, none makes over \$16,000. However, some of those with more than 20 years service in the industry are still below \$10,000.

The average plant manager has been with his present company for 16 years, and in production for 15 years, although he has held his manager job for less than five years. Some 26-30% of the managers are



24,830 successful installations!

EASTERN D-11 CENTRIFUGAL PUMP

Why is the D-11 so successful among original equipment manufacturers? *Size and weight* make it ideal. The D-11 is the smallest, close-coupled, single-stage centrifugal pump available with an induction type motor. Eighteen pounds of compact design (9 $\frac{3}{4}$ " x 4 $\frac{5}{8}$ ") make it excel in industrial and process equipment, as well as laboratory service, and pilot plant operations.

SPECIAL METALS

A full selection of metals make the D-11 and other Eastern Centrifugal Pumps versatile performers. Available in 18-8 Type 303 and Type 316 Stainless Steel, Monel, Hastelloy "C", Cast Iron and Bronze, Eastern Pumps range from $\frac{1}{8}$ th to $\frac{3}{4}$ H.P. with capacities up to 70 G.P.M., pressures to 65 P.S.I.

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Eastern



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PRODUCTION

	Yes	No	No Reply
Would you be qualified for a position of equivalent or greater responsibility outside the production function?	67%	28%	5%

	Yes	No	No Reply
Would you be happy in a position of equivalent or greater responsibility outside the production function?	56%	35%	9%

	Yes	No	No Reply
Are you happy in your present position?	98%	1%	1%

Happy in their jobs, plant managers indicate varied experience outside production chores, but all are not sure they are qualified for a similar management position in another function, seem even less interested in being moved to such a position even if qualified. Largest number, 45%, have experience in engineering, but less than half would like to return. Of the 37% with a research background, only 7% would be happy there.

In what other functions . . .

	have you had experience?	would you be qualified?	would you be happy?
Engineering	45%	24%	20%
Research	37%	11%	7%
Sales	17%	9%	2%
Accounting	6%	1%	0%
Management	4%	24%	22%
Purchasing	4%	2%	0%
Industrial relations	2%	4%	2%
Other	9%	2%	1%

short of their 10th anniversary in either company or production experience, and 7% past their 30th.

In both cases, correlation with salary is rather poor. For instance, a few managers with under 10 years' service—either with the company or in production—are making more than \$24,000, while others with over 20 years are below \$12,000.

Job Satisfaction: Along with answers relating to salary and factors that affect it, *CW's* questionnaire turned up information (tables above and p. 36) pertaining to the breadth

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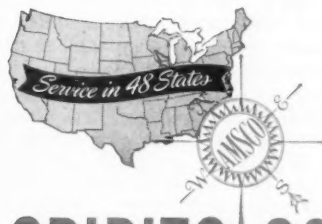
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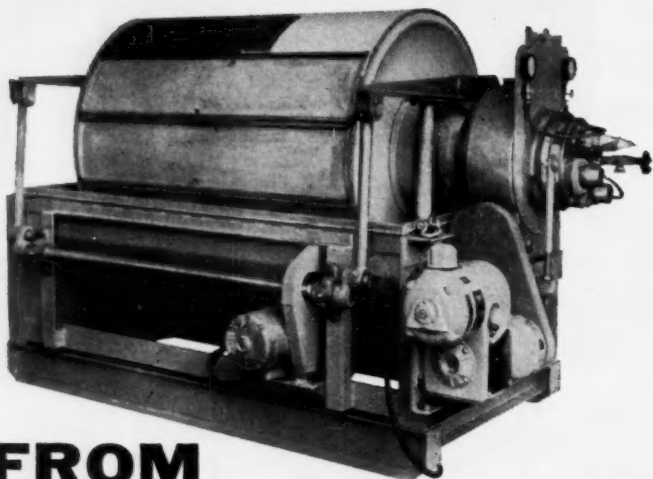
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cuts cost • reduces scaling problems

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It's the first commercially successful filter available with all essential components fabricated of a wide variety of glass reinforced plastics. Plastic selected is dependent entirely upon application.

Plastic construction results in lower cost than rubber-covered or alloy metal machines of comparable size and design. Reduced weight means economies in structural requirements, rigging and transportation. Apart from corrosion-resistance, the plastic surfaces offer special advantages where scaling is a problem, thus cutting maintenance costs. Snap-out rubber drainage grids provide for easy inspection and replacement.

The new Dorr-Oliver plastic filter has already been thoroughly tested handling acid leach solutions in a large uranium mill. It is backed by the long experience of Dorr-Oliver in building all types of filters. Models are available with filtering areas from 9 to 100 sq. ft. and 3-ft. and 4-ft. diam. drums with faces from 1 to 8 ft. For more information, write to Dorr-Oliver Incorporated, Stamford, Connecticut.



PRODUCTION

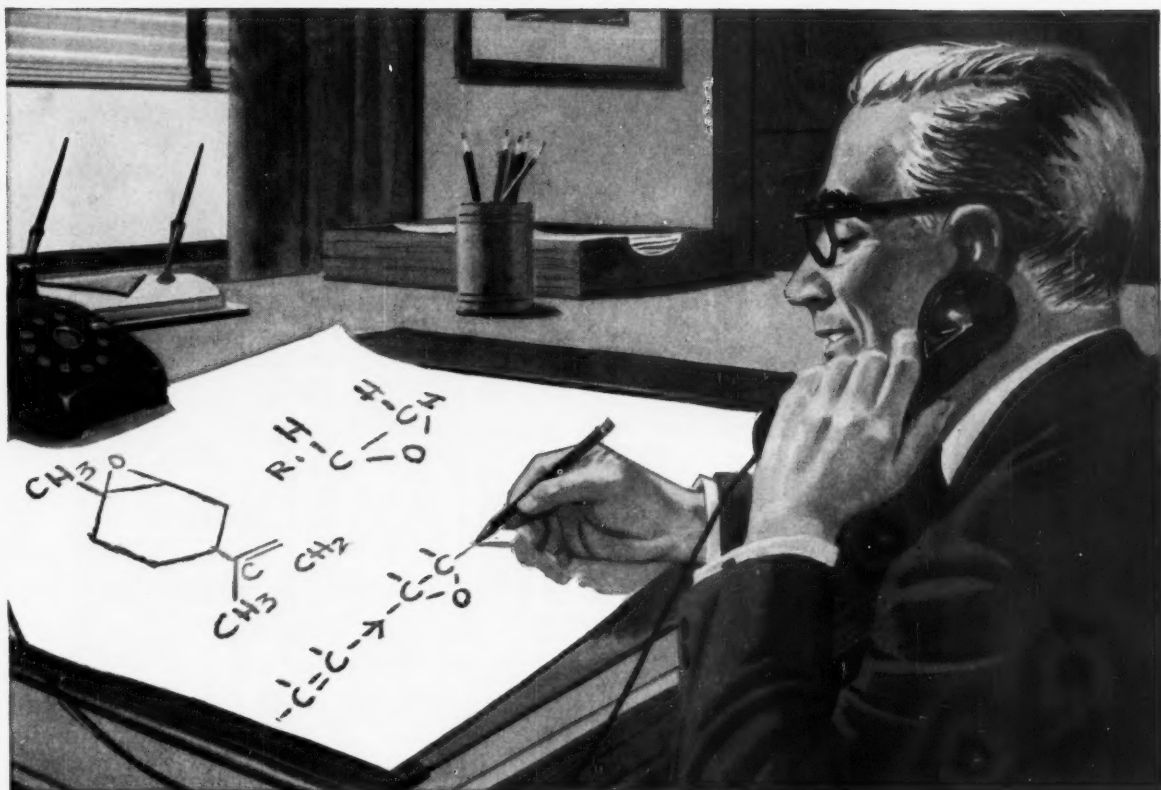
	Yes	No	No Reply
Do you foresee a transfer to an equivalent position within five years?	31%	62%	7%
Do you foresee a promotion within five years?	50%	41%	9%
Do you expect a salary increase of \$1,000 or more within five years?	90%	7%	3%
Do you expect a salary increase of \$5,000 or more within five years?	41%	43%	16%

Plant managers' forecast of their progress in the next five years, both in job and in salary: only about a third will transfer to an equivalent position; half will get promotions; nine out of 10 will get raises of at least \$1,000, while nearly half of them will get \$5,000 or more.

of the manager's experience, his job preference and his guesses on job and salary changes. His satisfaction with his production function is underscored in the 98% affirmative figure, and his forecasts bear out this satisfaction with a reasonable degree of optimism. All in all, the average plant manager appears to be well off, financially and emotionally.

Acid Separator Debuts

An acid-resistant membrane derived from a new vinyl-type resin is the key to a dialysis system offered by Graver Water Conditioning Co. (216 West 14th St., New York 11). The system, called Hi-Sep, has head tank and flow regulators for gravity flow to diffusion chambers of plate-and-frame filter-press type. The press has alternate solution and water cells in upright frames. Each cell is separated by a semipermeable membrane sheet. Flow rates of 50-500 gal./hour are possible with a unit having 850 sq. ft. of membrane area. Removal of up to ½ ton/hour of dissolved solids are possible with this size of unit, although it is not economical for recovering more than 80-90% of dissolved solids. Hi-Sep is suggested for separation of acids such as sulfuric, hydrochloric, nitric chromic, phosphoric and acetic; it may be used with other chemicals.



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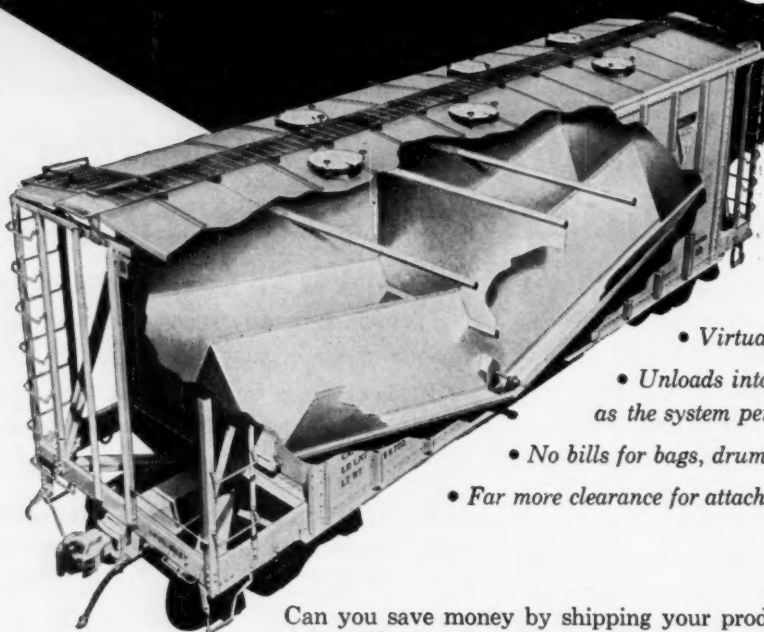
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Product A7

CONTENTS	CONTENTS	CONTENTS
Containers <u>BAGS</u>	Containers <u>BAGS</u>	Containers <u></u>
Rows of <u></u> each	Rows of <u></u> each	Rows of <u></u> each
8 Tiers of <u>36</u> each	2 Tiers of <u>30</u> each	8 Tiers of <u>30</u> each
Total B End <u>246</u>	Total Doorway <u>60</u>	Total A End <u>246</u>

Total 546 in car

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OUR MUTUAL
ore Unloading.
ce sure all damage or exci

12-0-925 RISER IN DOOR

Fast Photo Evidence Cuts Damage Claims

Photographic methods of pinpointing responsibility for damaged shipments may be the next step in the chemical industry's drive to improve quality control. Following up on successful experience that cut damage claims 80% at its Exton, Pa., plant, Foote Mineral, in a few months, will make picture-in-a-minute records its standard quality-control procedure for all shipments from all plants.

Earlier this year, Monsanto Chemical's Inorganic Chemicals Division put the idea into practice at all plants.

The company's Organic Chemicals Division, American Cyanamid, Wyandotte and U.S. Rubber's Naugatuck Chemical Division also photograph

outbound shipments but only if customers have previously complained of damaged shipments. Kaiser Aluminum employs the method systematically for all shipments from its Newark, O., mill-products plant, on a spot basis for other factories.

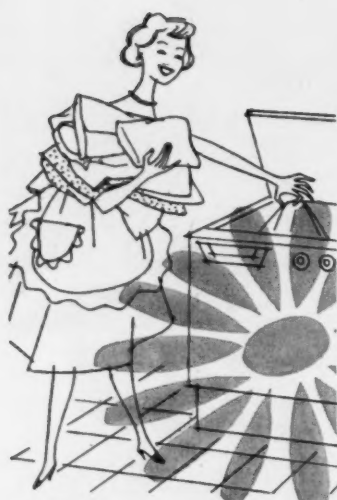
Photo records of shipments offer several advantages, chemical shippers report. For example, pictures show how merchandise was secured in the freight car at time of loading, says Monsanto's resin sales manager, August Hempel. If damage occurs, the photos help determine whether faulty loading or faulty handling by carriers was responsible. He credits use of photo records with ironing out

shipping difficulties with three sizable accounts of Monsanto.

Monsanto also uses photos to forestall difficulties. If a new routing or loading program gives any hint of trouble, the photo record system is put into effect until the new procedure proves out. The company's shipment photos have also produced constructive suggestions of better ways of palletizing.

Besides the advantages in fixing damage responsibility and cutting claims 80%, Foote reports a bonus in customer goodwill: pictures show the customers the thoroughness of care their shipments receive.

Simple System: Monsanto and Foote



The odor of CLEANLINESS

When it comes to the family wash, today's housewife demands above all else, that elusive and intangible "clean odor." What is it? Largely a psychological concept... however, certain carefully balanced combinations of perfume ingredients can give to a washday detergent that special "sunshine clean" quality. Furthermore, this desired fragrance will cling to the finished wash... if the perfume compound is properly formulated. In the D&O Industrial Odorants Laboratories, a complete group of such "washday fragrances" has been developed, not only for detergents but for blueing, starch and bleaches as well. Let the D&O perfume chemists put the "odor of cleanliness" into your laundry products. Samples on request.



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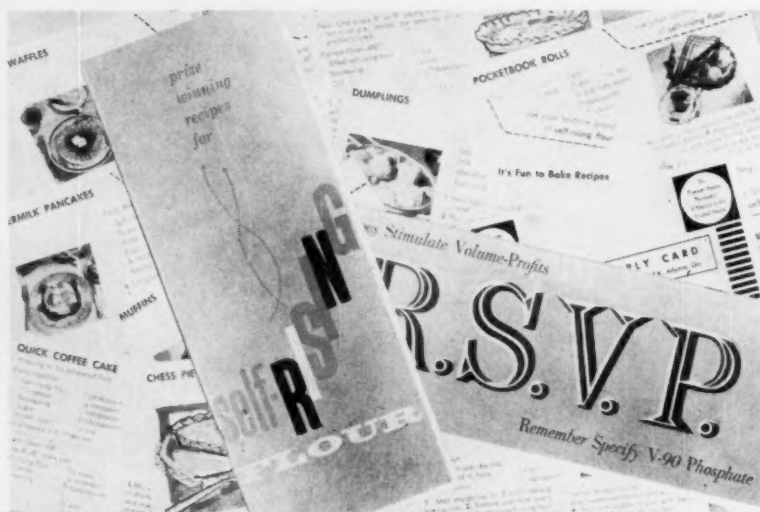
SALES

both use somewhat the same procedure. Two scenes in the rail car are photographed twice. Foote photographs opposite ends of the car; Monsanto photographs the loading pattern at one end and also at the center door. One set of pictures is sent with the car to the customer; the other is filed in company shipping records. At Monsanto Inorganic Division plants, the photos and an envelope

are attached to a special placard. The envelope contains a letter explaining the service and a post-card form that the customer fills out to report on the shipment.

Photographs are made with Polaroid Land cameras and film to permit more immediate processing of finished prints, speed up shipments. Camera operation requires no skill.

Foote is now using the method for



Self-rising flour recipes make market for calcium phosphate.

Recipes Cook Up More Sales

Recipes — dozens of them — this week hold the key to the success of a new drive by Victor Chemical for sales of monocalcium phosphate. The firm is merchandising a new promotional package to assist millers in boosting interest in home baking.

The "indirect" program, dubbed RSVP (recipes stimulate volume profits), has just been presented by top company executives to millers in the Nashville, Charlotte, Kansas City, Minneapolis and Chicago areas. The drive's aim is to boost sales of self-rising flour—each pound contains 6.5 grams of monocalcium phosphate.

The RSVP program suggests five basic ideas to millers:

- Arrange free TV showings of three Victor films that use the "It's Fun to Bake" theme.
- Offer the films to home economics classes.
- Conduct local recipe contests,

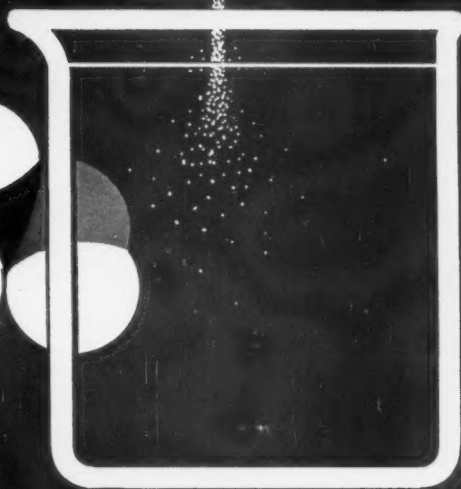
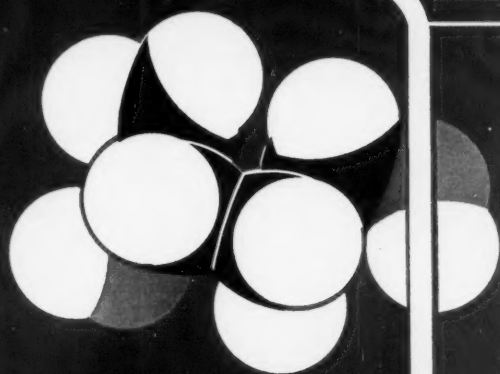
which appeal to women, even when prizes are modest. Special prizes to retail merchants (who sell the flour) reinforce effectiveness of the contest.

- Offer recipes through advertising, point-of-sale promotion, bag coupons, etc.

- Conduct baking demonstrations before women's clubs and similar groups.

In promotional activity before it launched RSVP, Victor displayed its three films over TV stations in 19 states. An offer of free recipes drew more than 19,000 requests. Victor also staged a recipe contest in a magazine distributed to home economists in schools and institutions. The contest drew 1,127 entries, almost three times the normal expectation.

Promotional programs by millers are only now starting. Success depends on how many housewives take to how many recipes.



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SALES

all outbound shipments of chemicals (except electromanganese) from its Exton plant and for rail shipments of spodumene lithium ore from its Kings Mountain, N.C., mine. Monsanto is photographing shipments of adipic acid and phthalic anhydride from its Queeny and Luling, La., plants. Foote makes some 200 photos/month at Exton. (Some truck lines make as many as 6,000/month.)

Using the system on a "when needed" basis, Wyandotte finds that usually only two or three shipments need be photographed to correct a difficulty.

Is the picture system costly? Foote estimates that the total cost of the four pictures, including labor, depreciation and materials is approximately \$2/car. At that price, Foote figures it's "a bargain," says that prevention of just one damage claim pays for hundreds of pictures.

Foote is making a broad use of photography. Pictures are now being employed to:

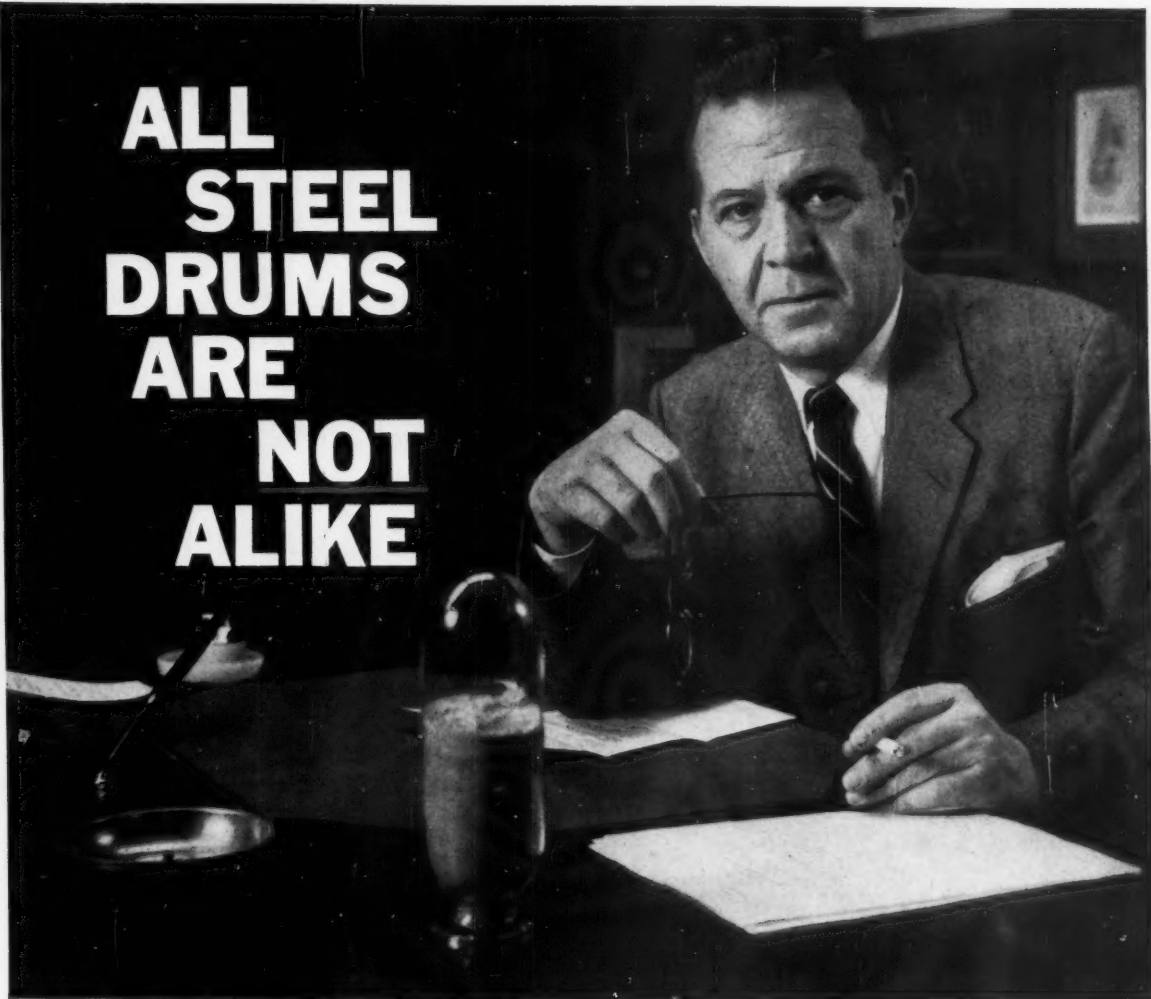
- Record condition of shipments received at Foote plants.
- Show customers proposed new containers.
- Train personnel in materials-handling techniques.
- Prevent accidents by showing reconstructed accident scenes.
- Show plant lab personnel how new equipment should be assembled.
- Record progress of construction projects.

More to Come: Spot-checking packaging and traffic personnel, CW finds warm enthusiasm and cool reserve for photo records of loading patterns. Some traffic men feel that the idea not only would cut down claims or fix responsibility for how damage occurred but also would help customers spot the locations of various parts of an order in mixed-car shipments.

Taking a somewhat different position, some packaging engineers feel that there is little need for such service unless complaints are received. They say sound loading practices should obviate the need for pictures. Moreover, some hold that the \$2/car cost figure may be somewhat low.

But most sources contacted by CW agree that using photo records is a good way to clear up complaint problems. And it's this application in quality-control procedures that the system is likely to find more jobs.

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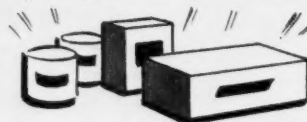


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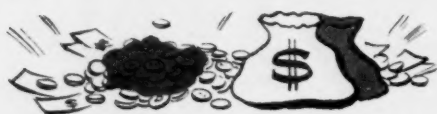
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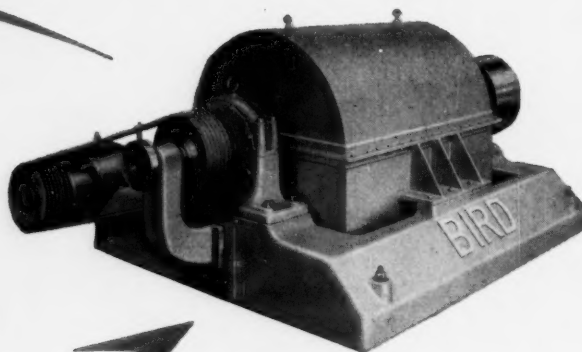


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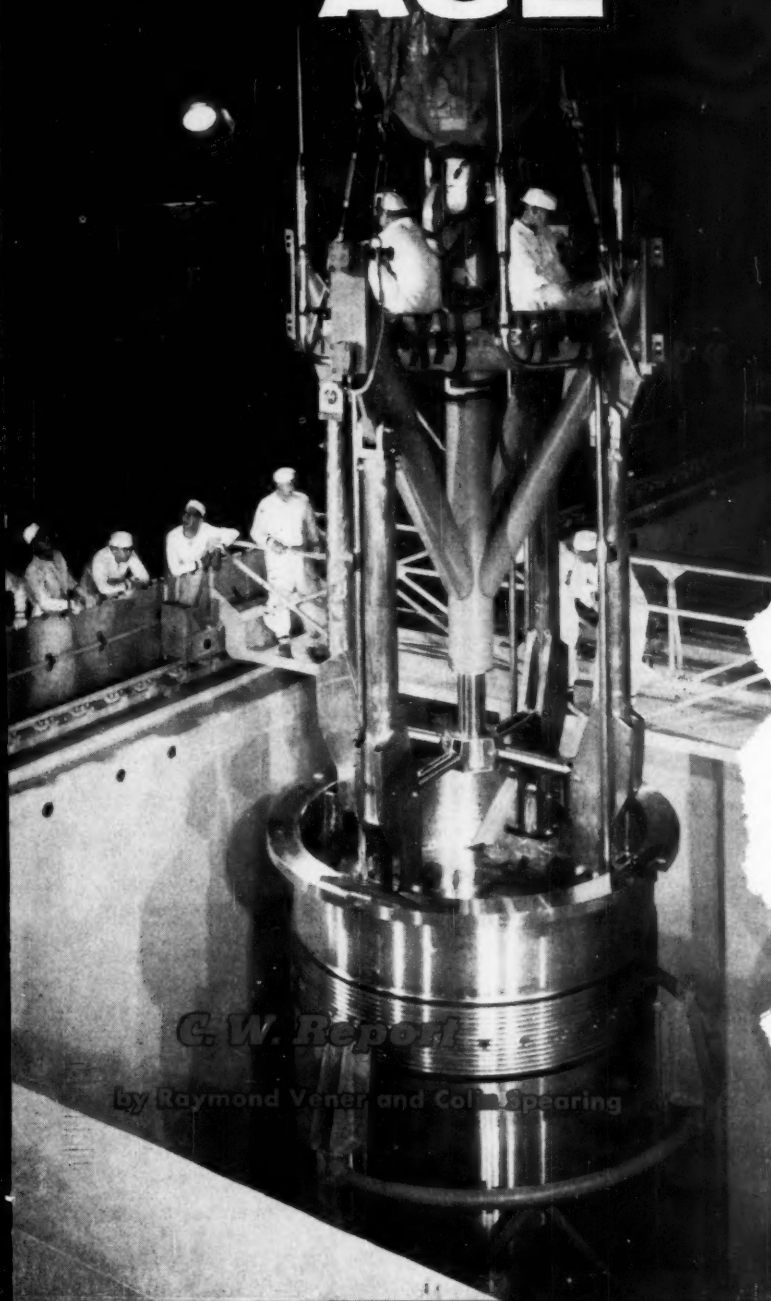
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ATOMIC ENERGY COMES OF AGE



C.W. Report

by Raymond Vener and Colin Spearing

The international atomic extravaganza staged in Geneva, Switzerland, last September attracted 6,300 participants, 2,700 delegates of national governments, 3,600 observers and 911 press representatives. A total of 2,135 papers were presented. To bring chemical process industries' management a meaningful message from this bewildering politico-scientific assemblage, *CHEMICAL WEEK* asked two top engineering management men to serve as *CW* correspondents at Geneva. They are Raymond Vener, New York-based manager of industrial research and development for M. W. Kellogg Co., and Colin Spearing, a director of Kellogg International Corp. (London, England). Their report from Geneva during the conference provided a news story for the Sept. 13 issue (*CW*, Sept. 13, p. 34). What follows, the result of careful analysis of a mountain of information disclosed at Geneva and the subsequent International Atomic Energy Agency meeting in Vienna, is the authors' interpretation of atomic prospects for the CPI.

ATOMIC ENERGY

COMES

EVOLUTION, not revolution, will characterize atomic energy development from now on. Under military aegis, atomic power became a technical—if not economic—reality almost overnight and a new industry was born. Today, slightly more than a decade later, many spectacular scientific breakthroughs have already been made. Future progress will be a matter of pruning operating costs, optimizing processes and equipment.

Signaling this new, more mature phase of atomic development is AEC's two-week-old fuel-cycle program (*CW Washington Newsletter*, Oct. 25). Industrial contracts awarded under this program will be for research and development aimed at reducing costs of fuel processing, reprocessing and fuel element fabrication. An appropriation of \$28 million is earmarked for this purpose.

The coming of age of atomics gives the chemical process industries new incentive and a more stable basis for exploiting profit-yielding opportunities in this heretofore mercurial market. The first challenge for management is to recognize these opportunities.

Here, in the light of disclosures at Geneva,* is a CPI-oriented analysis of five key areas of the atomic program. Included: (1) raw-materials operations (uranium ore mining and milling); (2) feed-materials processing (making uranium metal and oxide); (3) reactor operations; (4) spent-fuel reprocessing; (5) radioactive waste disposal. Prospects of thermonuclear fusion are also discussed.

*Second International Conference of the United Nations on the Peaceful Uses of Atomic Energy.

RAW MATERIALS

Essentially all of the U.S. work revealed at this year's Geneva conference had been reported in detail elsewhere. Parallel approaches and considerable duplication are evident among the efforts of the U.S., U.K. and other countries in uranium milling, mining, leaching, ion exchange, solvent extraction, alkaline processing and slurry extraction.

AEC estimates that non-Communist nations currently can produce about 35,000 tons/year of uranium oxide (U_3O_8). By '59, collective production of three countries should increase to at least 42,000 tons/year: 21,000 tons/year in the U.S., 15,000 tons/year in Canada, 6,000 tons/year in South Africa. Each country could considerably boost production if necessary.

AEC figures that its going price of \$8-10/lb. of U_3O_8 will bring in

enough of the material to meet anticipated U.S. needs. If U_3O_8 demand markedly increases, the price will doubtless be hiked to encourage exploration, development and mill construction.

The projected U.S. domestic price of \$8/lb. during '62-'66 is expected to return a profit to most of the mills now in operation. That's because many of them will have been fully amortized by '62. Currently, 26 uranium milling plants are either operating or under construction in the U.S. Included in this total are three that process phosphate uranium-bearing deposits.

Known deposits in South Africa, Canada, the U.S. and France should provide in excess of 2 million tons of U_3O_8 , with another 2 million tons likely from future discoveries. World reserves of high-grade uranium ore may yield an estimated 10 million tons of U_3O_8 .

In the U.S., shale, lignite and phosphate deposits contain extensive amounts of uranium, but extraction costs vary widely. Shale deposits, for example, contain many millions of tons of uranium; recovery costs are prohibitive at this time. No amount of prodding has elicited specific information on the uranium resources of the Communist bloc.

Outside the Iron Curtain, known deposits of thorium oxide are estimated at 500,000 tons, chiefly in India and Canada. Limited demand, however, has sparked little incentive for exploration.

Nine-tenths of the U.S. beryllium requirements are imported. Australia and the U.S. supply 90% of the world zirconium production. U.S. zirconium reserves alone are estimated at about 3 million tons of reactor-grade zirconium. Zirconium oxide production in the U.S. is pegged at 56,000 tons/year.

ON INTERNATIONAL AGENCIES

Immediately following the first world atomics conference in '55 at Geneva, AEC declassified information on the entire raw materials field. Yet until very recently, it was sometimes more difficult to obtain complete data on U.S. uranium milling operations than to get more highly classified data on many other operational areas.

But for the most part, milling operations involve technologies that are familiar in extractive metallurgy. Continuous ion-exchange and solvent extraction techniques applied to slurries and clear liquors are being worked on in several countries and should have broad implications for recovery of other nonferrous metals.

Currently, the solvent extraction method is applied in about one-third of all U.S. uranium milling capacity, continuous ion exchange in one-third and alkaline processing in one-third. Both solvent extraction and ion-exchange techniques will grow into wider application in the future because each brings special advantages to the refining of certain types of ores and clarified or slurried solutions.

Direct conversion of uranium ores into refined products at the same site is still not operational (various groups have urged AEC to adopt it). Arbitrary delineation of administrative responsibilities for raw and feed material have kept AEC's Raw Materials Division from sanctioning this desirable integration of operations. Improvements in ion exchange and solvent extraction make integration of milling and refining operations all the more attractive now, especially for large-capacity mills.

AEC's Raw Materials Division representatives have reassured uranium producers that fusion developments are no threat. Even when fusion is a commercial reality, AEC officials say, there'll still be demand for fissionable materials.

FEED MATERIALS

The recent U.S. decision to declassify the key feed-materials and fuel-element fabrication operations prompted many papers on these subjects at Geneva. As a result, many

Q. *Do you consider the formation of Euratom to be a significant development?*



SPEARING

Spearing: Indeed, yes. It's one of the most significant events of the year in nuclear power development. When Euratom was formally established in January of this year, it linked Belgium, France, the Federal Republic of Germany, Italy, Luxemburg and the Netherlands into a joint scientific effort to exploit the potentials of atomic energy, especially in power applications. I should add, of course, that Euratom is fully aware of its own limitations and acknowledges the need for close cooperation with the U.S. and the U.K.

Q. *What kind of agreement was recently made between the U.S. and Euratom?*

Spearing: The primary objective of the agreement is twofold. One goal is to produce in the Euratom community by '63 about 1,000 electrical megawatts of installed nuclear capacity in reactors of proved types developed in the U.S. The second objective is to initiate immediately a joint research and development program based on the reactor plan. The total capital costs, other than fuel, will be provided by the participating parties. Plants will be built, owned and operated by utilities in the member countries.

Q. *What were the provisions for funds in this U.S.-Euratom agreement?*

Spearing: Actually, the 10-year reactor and fuels program provides that contributions of about \$50 million apiece for the first year be made by the U.S. and Euratom. The sum for the second 5-year period will be determined later, as I understand it. The U.S. will sell U-235 to the community and will process spent fuel. In turn, Euratom will supply operating data to industries within the community and to the U.S. In addition, Euratom will cooperate with the International Atomic Energy Agency. I should remind you that neither Euratom nor IAEA is fully operational as yet.

Q. *How important is IAEA?*

Spearing: The potentialities of the agency are tremendous. Its permanent scientific staff already covers almost every aspect of nuclear energy. Its current program involves technical assistance, training, exchange of information, supply of materials and equipment, as well as regulatory activities. Many delegates at this year's Geneva conference voiced the hope that the agency would take the initiative in suggesting future international technical conferences on a smaller scale than the Geneva conferences. AEC, as you know, proposed at the recent Vienna meeting of IAEA that research projects be assigned to the agency, which, in turn, would assign the programs to scientific groups throughout the world.

ON INDUSTRY'S ROLE

Q. *Has atomic development taken full advantage of the know-how and skills of the chemical process industries?*

Spearing: No, largely because of secrecy of work in this field. Even under normal circumstances, the interchange of technological information between different industries and different scientific disciplines leaves much to be desired. It's not surprising, therefore, that under severe conditions of secrecy, processes were not improved to the fullest. Surely, there's a need for continued mutual exchange of information among nuclear and other chemical processing industries. Many papers at Geneva on fluid- and moving-bed processes, for example, demonstrated a somewhat belated appreciation of the techniques that have for many years been used in petroleum refining operations.

Q. *Is atomic information becoming more available?*

Vener: If you mean, Is there greater declassification of information? the answer is yes. But security restrictions, not only in the U.S. but also in foreign countries, are being supplanted by company-confidential types of restrictions, especially where publications are concerned. With the easing of security restrictions, there's a growing need for better organization of this mushrooming volume of technical information. The bulk of atomic data and information should be disseminated via existing publication and other communication channels.



VENER

details are now available on solvent extraction of UO_3 from concentrates, reduction to UO_2 and hydrofluorination to UF_6 .

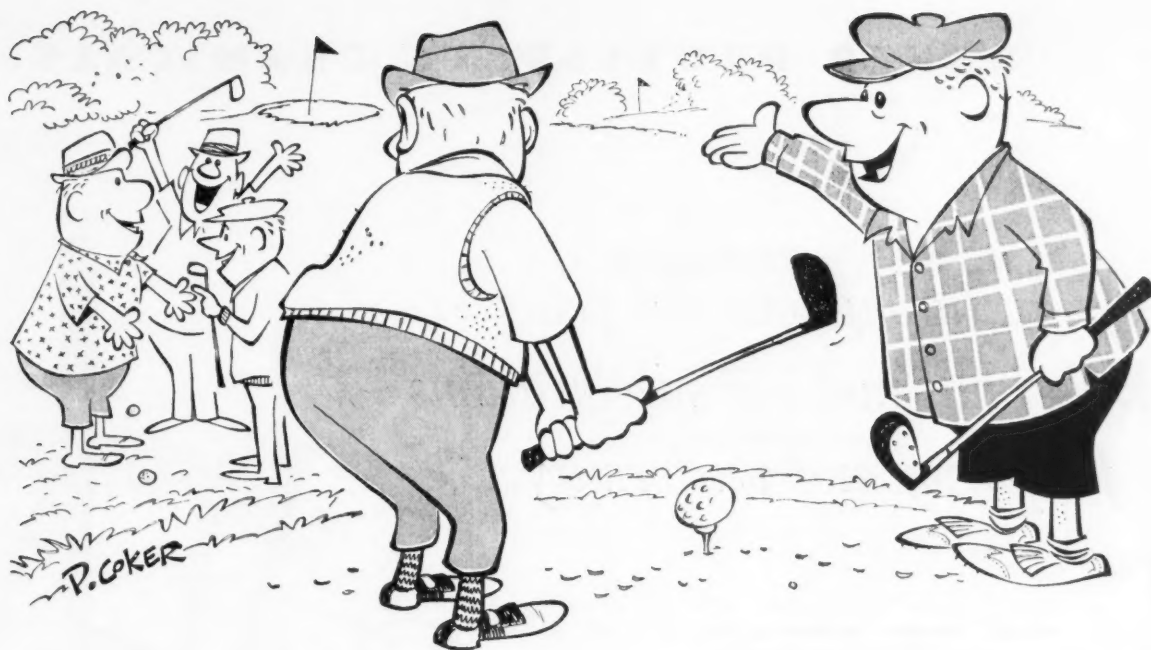
New solvent extraction schemes are coming into use. Moving-bed and fluidized-solids reactors are supplanting older screw and vibrating tray equipment for converting UO_3 to UF_4 . New data are available on the reduction of UF_6 to UF_4 , on the conversion of UF_6 to UO_2 , on the combined large-scale "dingot" (direct ingot) process and on fabrication of metal and UO_2 fuel elements. Also out: details of the new process for converting uranium concentrates into UF_6 by a fluidized solids method, followed by fractional distillation of UF_6 .

While declassification of information on feed materials and fuel fabrication continues apace, AEC still regards gaseous-diffusion separation of uranium isotopes "top secret" for military reasons. In contrast, the French atomic energy agency apparently intends to publicize much of its acquired technology on gaseous diffusion separation of uranium isotopes.

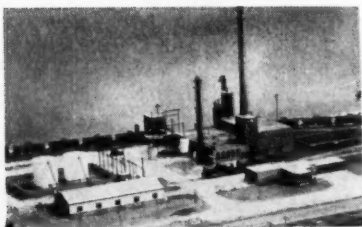
Much foreign development work in the feed materials operations area is obviously an offshoot of processing concepts that were introduced by the U.S.

Several nations are increasing emphasis on separating uranium and hydrogen isotopes. Heavy-water production plans were revealed by several countries at the Geneva meeting. Results of pilot-plant separation of U-235 and U-238 were reported by France, West Germany, Netherlands, Switzerland and the U.S. Processes include gaseous diffusion through barriers, nozzles and ultracentrifuges. Electromagnetic, chemical and other isotope-separation schemes are also under study in world atomics laboratories.

The status of U.S. feed-materials technology cannot be correctly gauged from the processes now used at AEC facilities. Reason: AEC is more concerned with meeting military requirements than with optimizing process operations. This has hindered the rapid adoption of much new technology in this and other AEC operations. In fact, the U.K. has exploited a number of AEC developments prior to their adoption



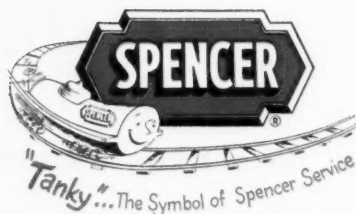
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September 29, 1958

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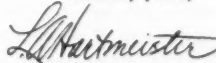
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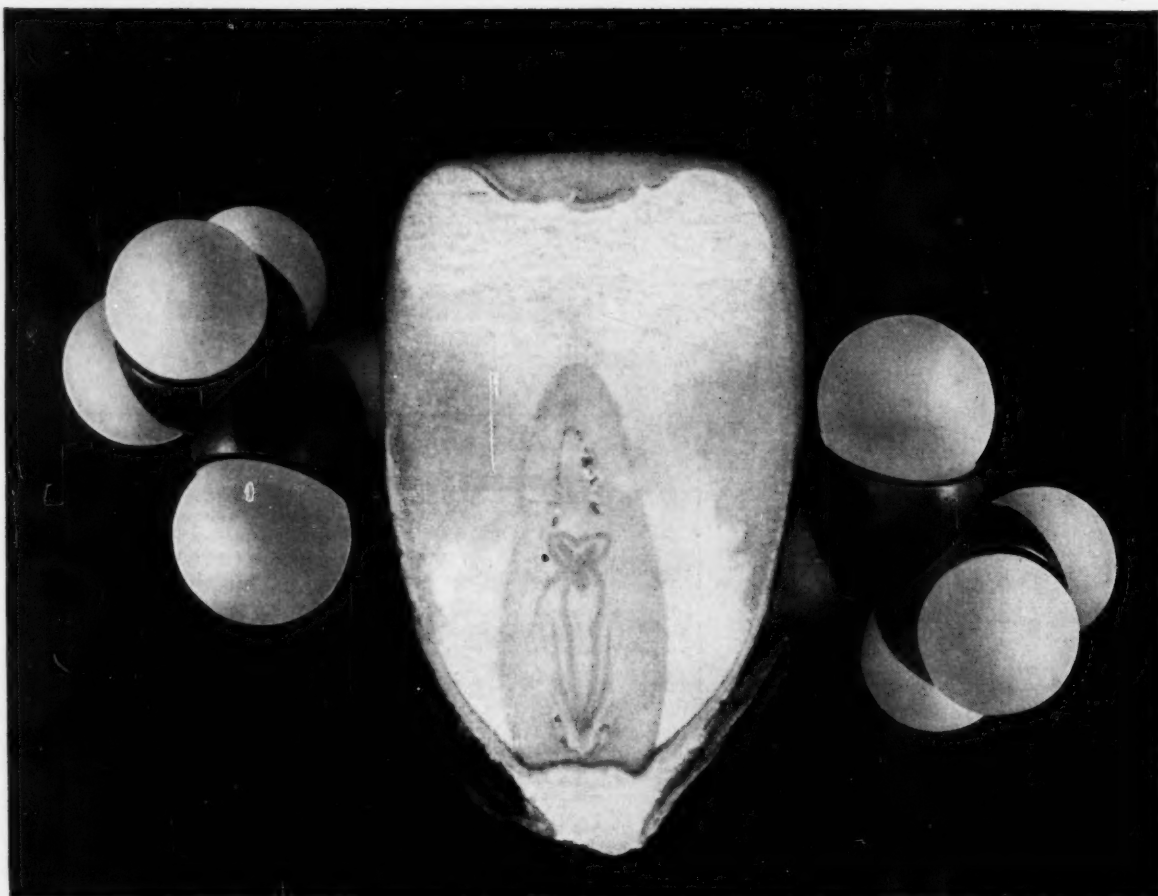


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in the U.S. There is a tremendous volume of data and information on processing concepts that are more economical than those now in use here.

POWER REACTORS

How are the world's first large-scale nuclear power stations doing in the U.S., U.K. and U.S.S.R.? Twelve major reactors, with a useful capacity of 200 electrical megawatts are now operating—eight in the U.S., three in the U.K. and one in the U.S.S.R.

In the next several decades, nuclear power stations will be installed throughout the world to an extent not visualized a few short years ago by many enthusiastic nuclear power proponents. By '70, nuclear power plants throughout the world will have a total capacity of over 15 million electrical kilowatts.

The consensus, moreover, is that the 12 reactors now in operation are surprisingly less troublesome than was anticipated. None of the nuclear power stations built to date were expected to be economic.

Three-Way Break: The economics of international nuclear power are clarified by putting countries into three categories:

The first includes large industrialized countries with extensive power available from coal, oil or water resources. The U.S., Canada and the U.S.S.R. fall into this group. In the U.S., in fact, the market for relatively high-cost nuclear power will probably be less attractive than anywhere else in the world, at least for the next 10 years.

The second category of nations includes industrialized countries, especially in Europe, which do not have large conventional power resources. The U.K., West Germany, France, Poland, Czechoslovakia and Italy are in this class. They are the best potential customers for nuclear power at reasonable cost levels—at least over the next 10 years. By '70, nuclear power will become a significant factor in these countries.

Australia and underdeveloped countries in Asia, Africa, Central and South America are included in the third category. These nations must carefully weigh atomic vs. conventional power development in the light of their individual capital and technological limitations.

Q. *How can the CPI keep abreast of atomic developments, to evaluate business opportunities?*

Vener: It's difficult to generalize because companies vary greatly in size, type, organization and goals. But here are a few recommendations that apply to most firms:

First, instruct all technical personnel, no matter what function they're in, to keep abreast of developments in atomic energy that relate to their fields. This isn't as simple as it sounds because of security regulations and the difficulties encountered with the organization of atomics data. AEC access permits may be necessary.

Second, assign key individuals the job of following and objectively reporting on atomics developments that relate to the companies' interests—ion exchange, solvent extraction, fluid-bed techniques, for example.

Third, avail yourself of the services of nuclear specialists and consultants, if their help seems indicated.

Fourth, participate actively in meetings of groups such as the American Management Assn., National Industrial Conference Board, Atomic Industrial Forum and others that organize special atomics symposiums.

Fifth, initiate some atomics work, even on a limited basis. There's no better way to take any new technology in stride.

And last, encourage selected personnel to obtain special nuclear training. If necessary, recruit personnel who have already received such training and use them to train others in the company.

Q. *What advice would you give companies considering atomics as a profit-making venture?*

Vener: That's easy. Avoid the glamor, promotion and crystal-ball gazing that plagues atomic activities. There are established scientific and engineering disciplines that process companies already apply in their regular businesses. In the entire atomics program, there has arisen only one new profession—engineering physics. All others rely on the same scientific and engineering talents found in industry, especially the chemical process industries. In a nutshell, fit atomics into your existing framework of knowledge and experience. Don't put atomics on a pedestal.



Q. *Are AEC's and industry's atomic development programs properly set up for the long haul?*



Vener: No one could deny that the government-industry team has made extraordinary progress in harnessing the potentialities of fission in the past decade. On the other hand, the tendency has been to overemphasize empirical practice at the expense of theoretical knowledge. What I'm saying is that in any rapidly evolving technology, theory lags far behind practice. For the long-term haul, we will require a much higher ratio of top fundamental scientists to engineers than we now have in the nuclear programs of both AEC and industry. I don't think this fact is too well appreciated by either group.

Q. *Were any important scientific breakthroughs made in atomics in the past year?*

Vener: None to speak of, although progress has been steady in most areas of atomic development. In fact, the Geneva meeting reaffirmed the evolutionary nature of most nuclear research and development activities in the world. Anyone who's looking for sensational announcements of revolutionary scientific breakthroughs in atomics would, I'm afraid, be disappointed.

Q. *What is the status of radioisotope applications in industry?*

Vener: The U.S., U.K. and U.S.S.R. lead the world in production of radioactive isotopes used in industry, medicine, agriculture and the basic sciences. The U.K. at this time declines to hazard a guess on the savings achieved by using isotopes, because it would be too speculative and intangible. AEC, however, estimates that some \$500 million are saved annually in the U.S. by use of isotopes in various industrial applications. The U.S.S.R. estimates current savings from isotope usage at over 1 billion rubles annually.

Except for tritium as a new tool in biological and physiological research, there's little new on isotope applications. The greater availability of tritium will be reflected in reduced prices. Tritium permits easy labeling of complex organic molecules without disturbing their structure or necessitating the synthesis of entire compounds. The outlook is that tritium, a soft "beta emitter," will prove almost as valuable as carbon-14 in studies of metabolic processes, including those involving nucleic acids.

Q. *How much progress has been made in applying radiation to chemical processes?*

Vener: Research programs have been initiated in many coun-

Lineup: The U.K. is well ahead in programed reactor capacity (it will have 5,000-6,000 electrical megawatts by '66). Except for some long-range development on fast breeders, the entire U.K. effort is focused on natural uranium, gas-cooled and graphite-moderated reactors—proved technologically successful at Calder Hall.

In the U.S.S.R., a 400-electrical-megawatt nuclear station is under construction; it will use four uranium-graphite reactors. Superheated, high-pressure steam is the heat-transfer agent. This installation will be similar to Russia's first nuclear power plant, operating since '54. Capacity: 5 electrical megawatts. Many improvements will go into the new station, state the Russians. They give no estimate of completion date.

Adequate conventional power available at reasonable costs permits the U.S. to pursue a comprehensive study of the merits of different power reactor systems. Since ultimate evaluation of reactor concepts must be based on experience with full-scale plants, the AEC program is geared for close cooperation with other countries' efforts in this area.

AEC helps these nations get their power reactor programs going; they, in turn, supply valuable reactor performance data. The International Atomic Energy Agency (IAEA) and Euratom hope to effect this cooperation.

Cost Caution: Although nuclear power costs are being quoted more cautiously than in the past, they are still being bandied about without adequate reference to the assumptions upon which they are based. This applies to both capital and operating costs.

Generalized cost comparisons have repeatedly been shown to be invalid, because power costs are made up of many factors that will vary in magnitude from case to case. Among these factors: fuel-cycle and maintenance costs; government subsidies of uranium and plutonium prices; waste-disposal costs and health-safety elements. And in most instances, these elements cannot yet be closely cost-estimated—additional technical and operating data are needed.

It's easy to arrive at any desired range of nuclear power costs simply by making some basic assumptions

(regardless of justification) and unqualified adjustments.

Lack of reliable nuclear power cost data underscores the need for economic and market projections on materials and services for this field that spell out the assumptions made in preparing them. Studies of this kind will be meaningful and of prime interest to all companies directly and indirectly concerned with generation of power by nuclear (or conventional) means.

FUEL REPROCESSING

The recent Geneva meeting added little to fuel processing information revealed at the more comprehensive and detailed Symposium on Reprocessing of Irradiated Fuels, held in Brussels in '57.

Aqueous solvent extraction is still the only proved technique of achieving the necessary separation of unused uranium and plutonium fuels from fission products and other contaminants.

Both anion- and cation-exchange processes are under extensive development. Nonaqueous, high-temperature pyrometallurgical methods are also under study. These include melt refining, fractional crystallization, fractional electrorefining, fluoride volatility and fused salt and liquid metal extraction.

For some years to come, economics in the U.S. will favor solvent extraction and, perhaps, fluoride volatility methods of reprocessing central power reactor fuel elements. Fuel types, enrichment ratios, attainable burnups and the growth rate of nuclear power are factors that will shape future fuel reprocessing technology.

WASTE DISPOSAL

The lack of effective ways to treat and dispose of radioactive wastes continues to hamper nuclear energy progress. And it's completely unrealistic for industry to expect that thermonuclear fusion power will eliminate this problem in the foreseeable future.

Waste disposal is the one area of the nuclear fuel cycle in which the least technological information is known.

Consensus today is that there is

tries to study the use of radiant energy in chemical processes. These programs include work on polymerization, vulcanization of rubber, oxidation of organic compounds, halogenation, cracking of hydrocarbons and improvement of catalytic reactions.

It's important to emphasize that these programs are still in early developmental stages. Vulcanization of rubber using radiant sources is strictly experimental. Numerous programs have been reported from petroleum laboratories working on radiation research, but there have been no commercially significant developments in the petroleum or petrochemical fields.

ON THE GENEVA MEETING

Q. *How useful was the Geneva atomics conference?*

Vener: In general, I'm opposed to scientific meetings on such a colossal scale. They're more like world fairs. Many papers apparently were accepted to provide representation for various nations, regardless of their merits. Unfortunately, a great deal of material presented was a rehash of information previously published or presented elsewhere in more detail. For AEC access permit holders, much of the U.S. material was many years old. That's why it's a big mistake for CPI management to judge the rate of atomic progress by the volume of papers issuing from Geneva.

Q. *What was wrong with the Geneva meeting?*

Spearing: In general, the number and scope of papers, lectures and exhibits were too large. Probably another meeting of this kind might even outgrow the last one. It is interesting to note that at both the recent atomics conferences, the U.K. and the U.S.S.R. urged frequent smaller conferences on limited topics. The U.S., however, seems very much in favor of future meetings of the Geneva format, sponsored by IAEA rather than by the United Nations.



Q. *What kind of showing did the U.S. make?*

Vener: The official U.S. exhibit was breathtaking. But it was also quite misleading in some respects. It conveyed the erroneous impression that thermonuclear fusion work was more than embryonic. The commercial exhibition managed by the Atomic Industrial Forum was unquestionably the best exhibit of its kind I've ever seen anywhere. The entire UN team turned in a truly remarkable performance of organization skill. Although the U.S. and the U.K. dominated the Geneva meeting, as far as quality and scope of papers and exhibits are concerned, there's no reason for complacency about progress in atomics in either nation.

still no good method of permanent disposal of radioactive wastes. Tank storage (e.g., as at Hanford) should be regarded as an improvisation, not a permanent answer. Studies continue on the tolerance limits of ocean and air dispersion, deposition in geological formations and on relatively non-leachable solids. But safe disposal of major quantities of radioactivity in environments will surely not be feasible.

This fact cannot be overemphasized: health safety is the single, most critical, factor limiting the development and application of atomic energy.

So far, waste disposal operations have been kept within safe limits. It's the anticipated large-scale disposal of radioactive wastes that causes widespread concern. And, while it's conceded that reactors present only a remote danger of damage from explosion, the accidental release of accumulated fission products could cause extensive harm.

At Geneva, there were calls for international organizations to cope with problems posed by disposal of radioactive wastes and possible accidents. These organizations presumably would deal with liability and permissible tolerance levels of radiation.

But little definite information is available on the latter score. Research on the biological effects of radiation is in an embryonic stage. As more and more data is accumulated over the next few years, there

will be a continual reappraisal of the criteria for biological protection and the allowable limits of environmental contamination.

The U.S. has taken a conservative approach to the health-safety problem by incorporating more than adequate protective features in reactor designs. Yet because of inadequate knowledge—e.g., on sources of neutrons and gamma rays, the interaction of these radiations with matter and the biological effects of these emanations as a function of unit energies—there is little opportunity to reduce shielding, refine reactor design. This is an especially acute problem where mobile reactors are concerned.

The World Health Organization recently published a report by a study group on the mental health aspects of the peaceful uses of atomic energy. The group emphasizes the need for forthright publication of the status of health-safety knowledge.

WHAT ABOUT FUSION?

In a joint action, prior to the Geneva conference, the U.S. and U.K. declassified their research on controlled thermonuclear reactions. The move was prompted by the realization that fusion research is still very fundamental.

What makes fusion's potentials intriguing are: very low fuel (deuterium) costs; an almost infinite supply (in water) of fuel; little radioactive hazard or waste; efficient operation

with the possibility of direct conversion of heat into electricity.

Despite considerable progress in the basic physics of thermonuclear reactions, fusion power will not be a reality in the next few decades. A sober appraisal by U.S. scientist Edward Teller—director of the University of California Radiation Laboratory—suggests that perhaps a century or more will elapse before fusion energy is harnessed for power. Teller stresses the vital importance of making advances in plasma physics.

Even after a self-sustaining controlled fusion reaction is attained, there remain tremendous technological problems. Material walls are required to separate the plasma from its surroundings; magnetic fields (the so-called magnetic "bottle") are needed to keep the plasma away from these material walls.

To produce controlled fusion reactions, three hurdles must be scaled: (1) the fusible material (e.g., deuterium) must be raised to a temperature of the order of 1 million C; (2) experimental techniques must be devised that will produce more energy than is consumed; (3) the technological obstacles must be overcome at a cost that will make fusion power competitive with that from other sources.

Optimistically, the first problem may be solved within 10 years. Solutions of the other two are probably many decades, maybe over a century, away.

Who Are CW Report Authors Raymond Vener and Colin Spearing?



SPEARING



VENER

RAYMOND E. VENER (Ph.D., '48, chemical engineering, U. of Pa.) is manager of industrial research and development for M. W. Kellogg Co. (New York). His orbit includes atomic energy, extractive metallurgy, petroleum, petrochemicals and chemicals. Since '42, Vener has been active in such functions of atomics as raw materials, feed materials, fuel reprocessing and isotope separation.

COLIN E. SPEARING is a director of Kellogg International Corp., (London, England). Formerly general manager of the refineries department of British Petroleum and a director of the B. P. Trading Co., he supervised B. P.'s postwar refinery expansion programs. As vice-president of Great Britain's Institution of Chemical Engineers, he's intimately concerned with developments in atomic energy.

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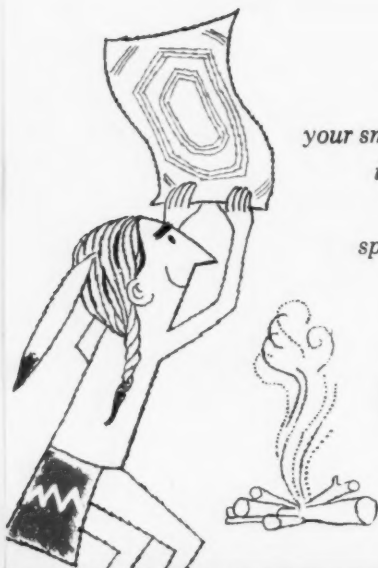
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SPECIALTIES

Robot Retailers Ring Up Specialties Sales

Two new specialties vending machines will soon make their debut. One, offered by Colma Inc. (Worcester, Mass.), dispenses Colma's hand lotions and hair creams; the other, offered by Kaleen Chemical Co. (New York), will dispense packets of Kaleen laundry products. Both seek a share of the \$2 billion spent yearly in the U.S. for machine-vended products.

Chemical specialties are not yet big factors in machine vending. But such products are well adapted to this form of retailing, which has just begun to show growth potential. Manufacturers of vending machines are particularly eager for specialties business; one Midwest producer says that within five years selling through vending machines will comprise a substantial portion of all drugstore and supermarket business. The machines relieve sales personnel from the single, under-a-dollar transactions, are intended to speed service and turnover.

Advantages such as these are behind the estimates that machine selling will reach \$10-billion/year volume by '70 and become a selling system that cannot be overlooked by specialties producers.

These optimistic reports must, of course, be viewed alongside the general reputation of machine vending and in light of the experiences of several specialties makers with the robot retailers. But despite the adverse publicity caused by some spurious vendors, there is evidence that this form of selling is coming of age. In the past few years, a number of specialties companies have quite successfully employed the machines.

Placement Paramount: At present, the most extensive market for machine-vended chemical specialty items appears to be the public washrooms of hotels, motels, service stations, night clubs, theaters and transportation terminals. Lipstick, cologne, deodorants, hand lotion, toothpaste, headache remedies, shaving kits, shoe-shine kits, hair tonics and even oxygen are sometimes available in such locations, where it's uneconomical to have a sales clerk handle them.

Soap Seller: Louis Twersky, president of Kaleen Chemical, told *CW*



Travel terminals are favored spots for machine-selling specialties.

CW PHOTO—LIONEL CRAWFORD



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SPECIALTIES

that, so far, he is optimistic but not enthusiastic about the future of vending machine merchandising.

His company has been in the business of vending laundry products for two years, has more than 200 machines placed in coin-operated laundries throughout the country. All of the company's vended products, sold under the Kal trademark, retail for 5¢ each, cost the operator 2½¢ each (the machine and the products are sold to the laundry operator).

Twersky also installs his machines in apartment houses—but these, he admits, don't make much money.

Also selling through machines are Self Service Laundry Sales and Calusa Chemical (Los Angeles). Both firms supply detergents, bleaching and bluing compounds packaged especially for vending machines. Both provide a complete vending service to their customers—they'll lease, rent or sell the machines.

According to Self Service, about 75% of its machines are owner-operated. Both companies sell the vending gear at close to cost, profit from the sale of their soap products.

Though both firms agree that sales have climbed rapidly in the last few years, neither predicts a big long-range market. Reason: neighborhood laundry operators seem to vacillate between offering a "service operation" (in which the laundry personnel adds soap, bleach, etc.) or "self service" operation (with customers adding machine-sold soaps, etc.). If the service operation has another surge of popularity, as some think it will, it could result in reduction of vending machine sales.

Dispenser-Sold: One item moving well in vending machines is cologne. Alphonse Savage, president of Colma, told *CW* that the present market for machine-vended colognes is around \$3 million/year. Colma manufactures machines that supply, for 10¢, cologne and after-shave as a mist directly to the user's face, rather than as a packaged item. The company has been using nationally advertised products in its machines but it plans to turn out its own brand of products soon. It will also put out a line of hand lotions and creams for use in its new 5¢/shot dispenser and a hair cream for a 1¢ machine installed at schools and public swimming pools. Savage is more optimistic about the

future of vending machine sales than many other specialties makers, says that what the industry needs is more packages turned out by manufacturers in capsule form—like some hair shampoos now on the market.

Vitamin Vender: Another product doing well in vending machines for one marketer is vitamins. Hightower Laboratories (Los Angeles) has been packaging vitamin pills for vending machines since '53. Charles Hightower told *CW* that these sales now constitute a significant part of his volume. His products retail at \$1 (four quarters) a bottle. Generally, the product is vended in small-to-medium-size plants, but he also services a large California aircraft plant.

Among factors contributing to the success of his products, he says, is "industry's growing awareness of employee well being." This, coupled with the fact that his type of selling relieves management of the fuss of distributing the vitamins, has opened a lot of doors to him.

On the other hand, he says, vitamins have a spotty appeal, on a national basis. Also, some states restrict the sale of drugs to drugstores. But the fight (seemingly a losing one) against drug sales through vending machines indicates just how seriously some retailers look upon vending machines as future competitors. Retail druggists in some states have been able to outlaw the sale of so-called nondrugstore drugs. But there are growing indications—such as the recent Washington, D. C., ruling (*CW*, Oct. 4, p. 24) permitting food supermarkets to sell aspirin—that there will be more vending of drug items in the future.

Over-all, the future looks good for vending machines. As labor costs go up, so will the desire for nonattended selling. Even in stores—particularly supermarkets—the machines will likely become more popular for dispensing small, nonfood items because they cut down pilferage and congestion at check-out counters.

Probably the one thing that will help vendors the most, however, is the spread of the recently developed dollar-changing machines, which will make vending more convenient.

All these factors emphasize the need for specialties makers to keep a close check on machine vending, be prepared to use it as a valuable adjunct to their present market outlets.

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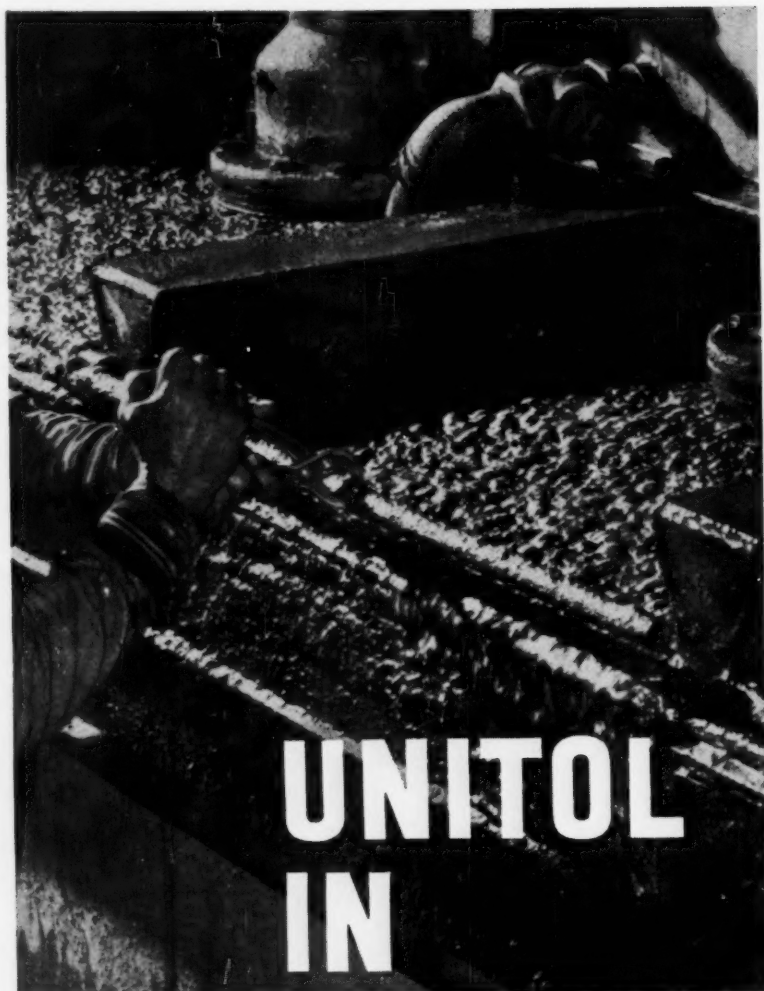


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SPECIALTIES

Watergrass Killers

Two new experimental chemicals that may lick the problem of watergrass in rice fields have shown up well in preliminary tests by U. S. Dept. of Agriculture agronomists at the University of California.

- **EPTAM** (ethyl di-*m*-propylthiolcarbamate), a Stauffer product, can be applied to dry soil at the rate of 1 lb. acre without injuring the rice. It's added to the dry field 10 days before the field is planted.

- **Randox** or **CDAA** (2-chloro-N, N-diallylacetamide), a Monsanto invention, can be used on soil that's been lightly irrigated. In experiments at the university, Randox was added at the rate of 4 to 8 lbs./acre before flooding the soil. The rice was then planted four days later.

Neither chemical has so far been registered for use on rice. Another year of tests, plus two-year yield data, must be completed before either can be suggested for commercial farm use.

Sticky Polymer

B. F. Goodrich has developed a rubberlike adhesive claimed to form "a lasting bond between incompatible surfaces." The new polymer is available as a laminating adhesive called **A-916-B**. The colorless, transparent material is prepared as a 50% solids solution, is said to have excellent storage stability. Application may be made by brush or roller, or the adhesive may be modified for sprayers. Some uses suggested for the material: laminating films or fabrics (Mylar, cellophane, cellulose acetate, Pliofilm, polyethylene, polyvinyl chloride, saran, nylon, rayon) or paper to metallic foils or to any combination of polymeric films.

Purex Purchases Puhl

Purex Corp. (South Gates, Calif.), which acquired Chicago soapmaker **Allen B. Wrisley Co.** last June, has just taken over another Chicago company. This time it's **John Puhl Products Co.**, a wholly owned subsidiary of **Sterling Drug Co.** The Puhl purchase adds **Little Bo-Peep** household ammonia to the **Purex** line of home laundry specialties. Besides Puhl's Chicago plant, **Purex** acquires manu-

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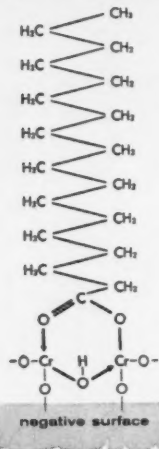
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Some chemists use "Quilon" as a size on paper for such products as frozen-food packages and bags, because it imparts excellent water repellency and "release" properties without changing paper's appearance, flexibility, porosity and strength.

Others find "Quilon" a useful treatment for leather to be used in gloves, work and safety shoes, because it reduces water and chemical damaging of the leather . . . adds service and comfort.

Still others apply "Quilon" as a highly effective insolubilizer for polyvinyl acetate and polyvinyl alcohol in paper-coating solutions. It also improves heat-sealing temperatures, toughness of the coating.

Your use for Du Pont "Quilon" may be one of these or a new, profitable use tailored to your own needs. Be sure to evaluate "Quilon" in terms of your own development work! Just write address given below for more information.



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SPECIALTIES

facturing facilities in Alliance, O., Roanoke, Va., and Houston, Tex.

Stanley Kord continues as president of Puhl, and has been elected a vice-president of Purex.

RCA Sells Detergent

Radio Corp. of America will this week send out its newest product, Orbit detergent. It will be marketed only through RCA's appliance servicing organization, R. C. A. Servicing Co.

Orbit, made for RCA by Procter & Gamble, is designed especially for use in top-opening RCA Whirlpool automatic washers. Sales at present will be by case lot only. Ten 2-lb., 15-oz. packages sell for \$7.50.

PRODUCTS

Odor-Fighting Finish: American Cyanamid is now offering a textile agent, Cyana Purifying Finish, which it claims kills the two types of bacteria said to cause the unpleasant odor of perspiration. It's supplied as an aqueous solution and is mill-applied. Cyanamid says the new finish will resist drycleaning and laundering, although it's somewhat affected by the use of chlorine bleach.

Oral Antiseptic: Warner Lambert Pharmaceutical is now marketing Sterisol, a new oral antiseptic. Chemically the material is bis-1,3- β -ethyl-hexyl- 5-methyl- 5-amino-hexahydro-pyrimidine (also known as hexetidine). A 0.1% solution of the material is claimed to produce significant and prolonged reduction of fungi and bacteria and eliminate objectionable breath. Bacteria does not build up resistance to it.

Optical Bleach: Carlisle Chemical Works (Reading, O.) has added Cellu-Brite D to its line of optical bleaching agents. The material is substantive to cotton, linen, wood pulp and cellulose-type fibers.

Residue Remover: New Era Specialties (Melbourne, Fla.) has introduced a product designed to remove residue insecticide from fruits and vegetables. It's a spray bottle-packed concentrate, is added to water. Price: \$2 for a 5-oz. bottle (enough to treat several hundred pounds of produce).



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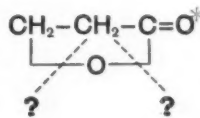
BPL is now being evaluated for use in the

textile and leather industries . . . as a component in the processing of plastics, paints, dyestuffs and synthetic fibers . . . in starches and adhesives . . . in medical and hospital applications . . . in agricultural and food technology . . . in nucleonics and astronautics.

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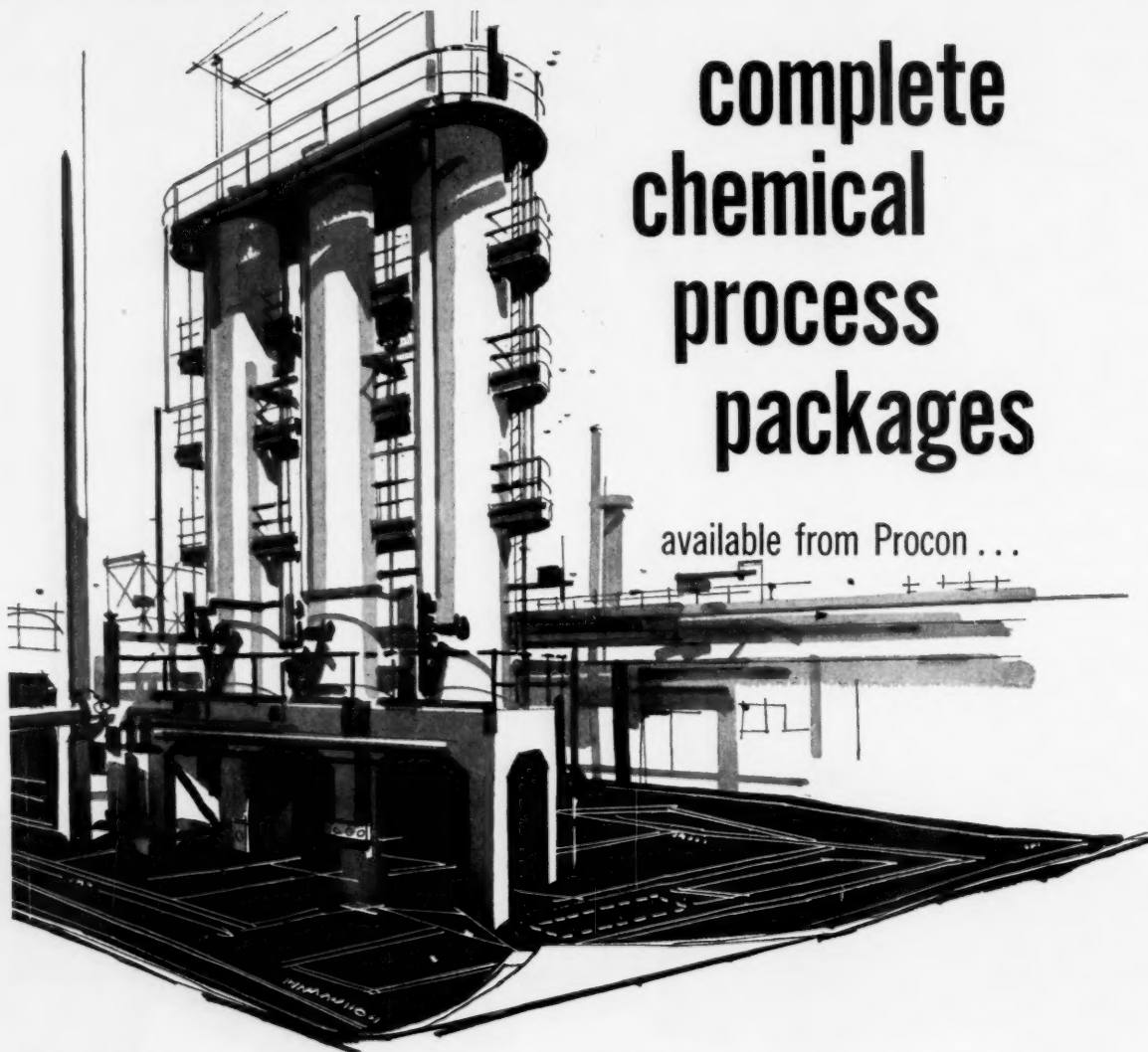


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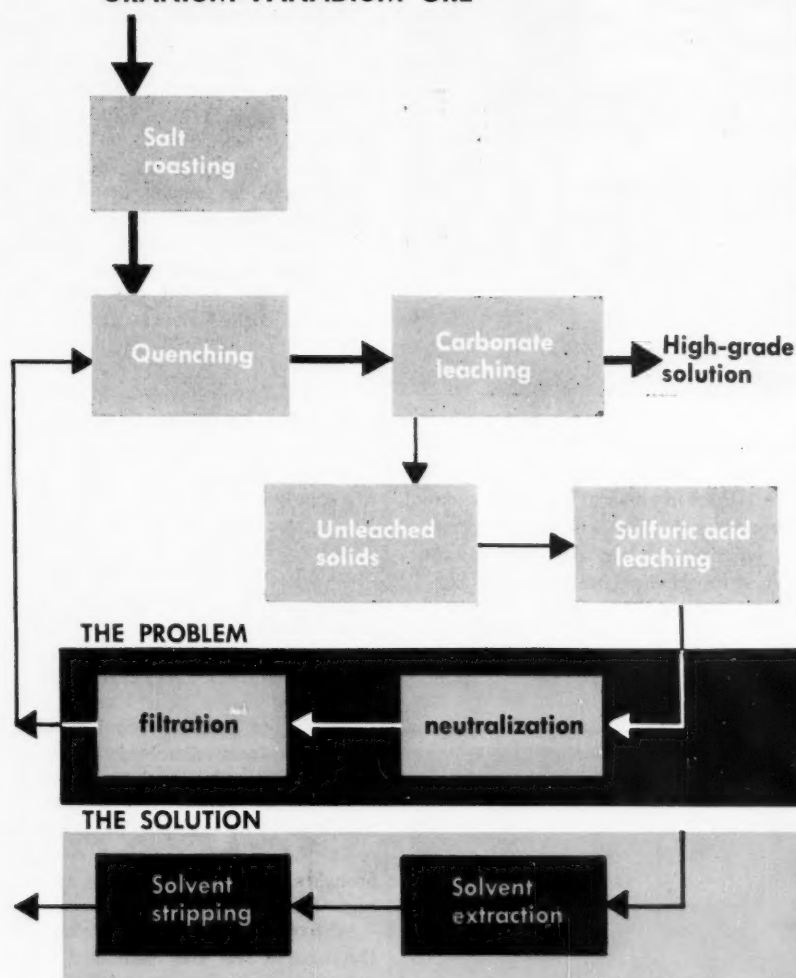


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Salt roasting of ore converts insoluble vanadium compounds into leachable vanadates.

CARBONATE LEACHING

Carbonate leaching yields high-grade solution of uranium and vanadium for final recovery step.

ACID LEACHING

Acid leaching recovers uranium and vanadium in undissolved solids from carbonate leaching.

FILTRATION

Filtration of neutralized acid-leach liquor is hampered by precipitated aluminum, iron oxides.

SOLVENT EXTRACTION

Solvent extraction boosts recovery of uranium and vanadium, minimizes impurities extraction, costs.

Solvent Extraction Bypasses Process Snag

Solvent extraction this week is breaking in on a new job aimed at increasing the yields and cutting the costs of a particularly troublesome recovery step in the processing of uranium-vanadium ores. A new technique — using a combination of extractants — is making its commercial debut in the recently revamped Durango, Colo., plant of Vanadium Corp. of America.

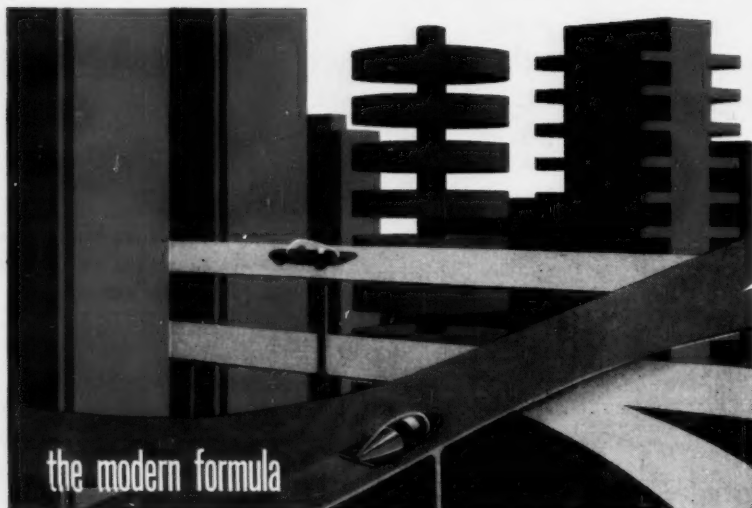
The process started off well at Durango but recently has had typical new-process troubles that VCA hopes to eliminate soon. The company wants to see the process operating smoothly

for a few more months before approving it and releasing operating details.

But details of the extraction system itself aren't entirely secret. The combined-extractant technique was originally developed by the U.S. Bureau of Mines at Salt Lake City. Working with leach solutions typical of the salt-roast plants conventionally used for recovering vanadium, USBM researchers found that mixed extractants gave better results than either amines or organophosphates used separately. The winning combination: an aliphatic amine combined with an alkyl phos-

phate in a solution of kerosene containing tributyl phosphate.

Recovery Problem: One of VCA's chief reasons for switching to the new extraction system was to eliminate an operating bottleneck peculiar to the processing of salt-roasted ore. In addition, with VCA's setup, vanadium recovery is an important economic consideration. To extract as much vanadium from the ore as possible, the company must treat leach liquors highly contaminated with aluminum, ferric iron and chlorides. In the conventional process, precipitates formed by these impurities present a king-size

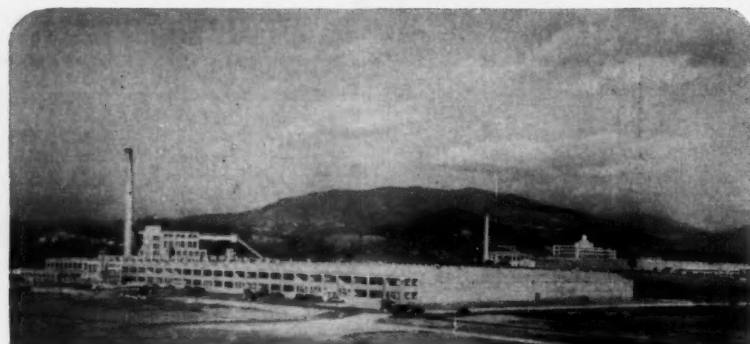


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ENGINEERING

filtration headache. Here's how the new process gets around this:

Uranium-vanadium ores generally contain uranium in a form that can be readily leached or dissolved out by sodium carbonate solution. But the vanadium is in a less soluble form, requires roasting with sodium chloride to convert it into a leachable compound, such as sodium uranyl vanadate. The roasting operation requires close temperature control to avoid conversion of uranium into a less soluble form; roasted ore must be quickly quenched to prevent undesirable reversal of the vanadium complexing reaction.

After quenching, the ore is leached with sodium carbonate. Pregnant liquor from the leach tanks goes to a final recovery operation, where the uranium is precipitated as yellow cake, leaving vanadium in the filtrate.

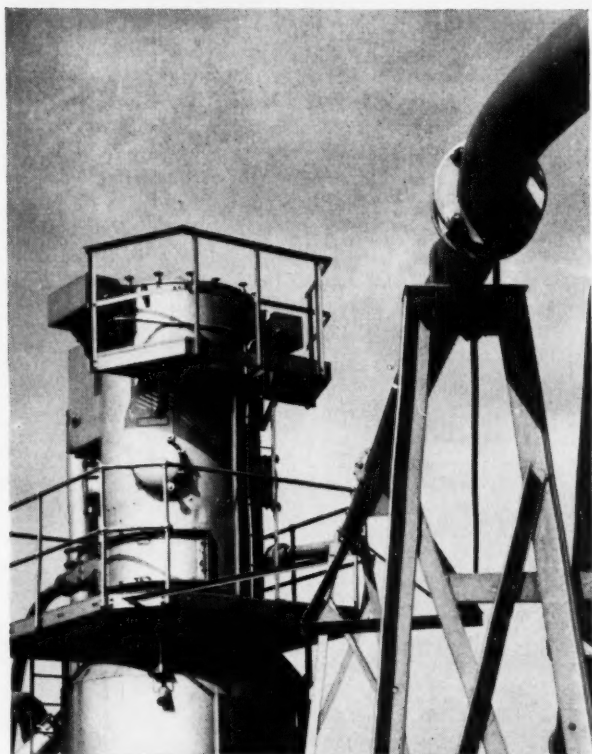
Solids from the carbonate leaching operation are sent to an acid-leaching plant for recovery of small — but economically significant — amounts of unleached uranium and vanadium. Solids remaining after acid-leaching are discarded; the clear leach liquor is treated to separate uranium and vanadium from dissolved contaminants for recycle to the carbonate leach system. This is the step that is hampered by the precipitation of hard-to-filter aluminum and iron oxides, brought down by neutralization of the acid leach liquor.

With the revamped installation at Durango, VCA has eliminated the carbonate neutralization and filtration operations, now solvent-extracts uranium and vanadium directly from the acid solution. Expected payoff: simpler operation, better recovery at lower cost.

Alternate Systems: In the course of its research on extractant systems, USBM found that effective extraction was also obtained with either secondary or tertiary amines in combination with di-2-ethyl hexyl phosphoric acid (EHPA) or heptadecyl phosphoric acid (HDP). One effective combination consisted of tri-fatty amines (TFA) with EHPA.

There's also some flexibility in the final solvent-stripping step. The loaded amine-organophosphate is readily stripped with sodium carbonate to give a concentrated solution of uranium and vanadium suitable for conventional processing. And the bureau

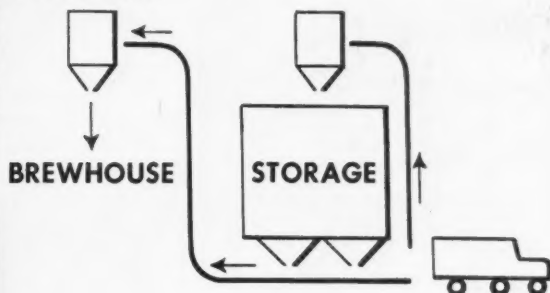
The Arithmetic of Materials Handling



FULLER AIRVEYOR pneumatic system pulls corn grits from discharge of Airveyor bulk transport trailer to storage silos to weigh hoppers.

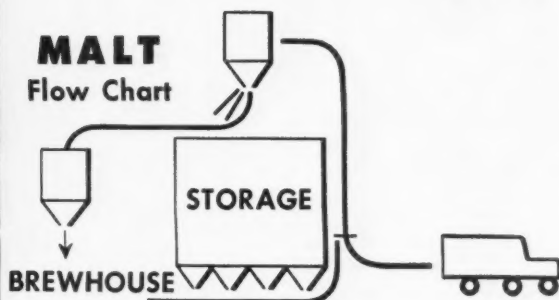
GRITS

Flow Chart



MALT

Flow Chart



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reports that stripping with caustic soda or ammonium hydroxide to precipitate the uranium and yield a filtrate containing the vanadium is another potentially promising procedure.

Though it isn't known for certain just how the combined extractants work, the results were better than USBM researchers had anticipated. The combination produced a synergistic effect resulting in higher extrac-

tion coefficients for uranium and vanadium. And even more unexpected, the new system eliminates almost completely extraction of troublesome aluminum and ferric iron by the organophosphate.

Climax Uranium (Grand Junction, Colo.) and Union Carbide Nuclear are reportedly considering similar vanadium-recovery systems to work with uranium solvent extraction.



Sulfur Sales from Sweetened Gas

Among the products to be supplied by British American Oil Co.'s new \$25-million processing plant at Pincher Creek, Alta., will be 435 long tons/day of sulfur. Elemental sulfur is recovered in large corrugated condensers (above) after burning hydrogen sulfide to sulfur dioxide and

catalytic reaction of the dioxide with more hydrogen sulfide. Sulfur is stored at the plant as liquid in two 750-ton tanks, as well as in solid form. Also produced are 50,000 gal./day of liquefied petroleum gas, as well as the plant's main product, 100 million cu. ft./day of salable natural gas.



Ross Hastie, vice president,
Hilton-Davis
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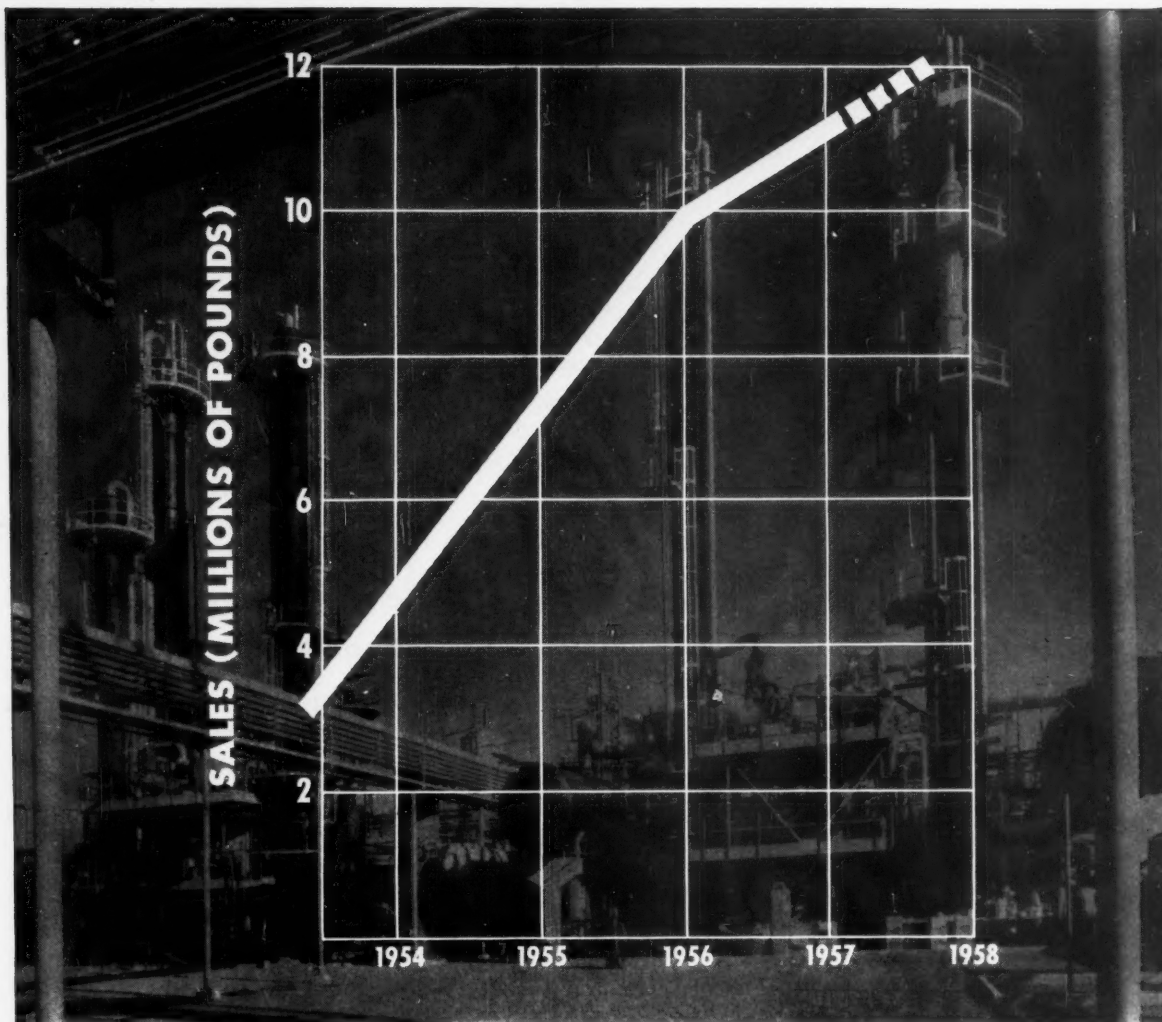
Tailored Hydrogen: Girdler Construction Division of Chemetron Corp. (Louisville), will tailor a hydrogen plant for Irving Refining Ltd. (St. John, New Brunswick) to produce 3 million cu.ft./day of 90% hydrogen. Since high purity is not needed, some purification steps can be left out of the new plant in order to reduce costs.

Pure Chromium: Chromalloy Corp. (New York) has obtained exclusive rights from Chilean Nitrate Sales Corp. to an iodide route to super-pure chromium, researched at Battelle Memorial Institute. The process is said to reduce impurity levels below 10 ppm., is similar to the iodide routes used on other metals (*CW*, July 13, '57, p. 27). The product, called Iochrome, is used in the development of chromium alloys for high-temperature service.

Stress-Relieved Aluminum: Aluminum Co. of America (Pittsburgh) has developed a new method of reducing internal stress in complicated aluminum and aluminum alloy shapes. It is described as a thermomechanical method applied during quenching of the shapes after heat treatment. Alcoa expects the method to greatly expand the range of stress-relieved aluminum products available to industry.

Metal Coating: A new method of coating sheet metal parts for resistance to oxidation, abrasion and corrosion is now offered by Wall Colmonoy Corp. (Detroit). The coating consists of a high-nickel-base alloy powder, called Nicrocoat, bonded with Nicrobraz cement. It is applied by spraying, dipping or brushing in thicknesses ranging from 2-10 mils, then bonded by heating to 1800-2150 F in pure, dry hydrogen atmosphere.

Direct Chromium Coating: A process for plating chromium directly to aluminum and aluminum alloys has been developed by Service Hard-Chromium Co. (Union, N. J.). The process, called Chrom-Lume, provides for direct coating of chromium to the basic metal with no intermediate deposition of copper, nickel or zincate, and the coating is said to be unusually hard and ductile.



GOVERNMENT FIGURES PROVE AMAZING GROWTH OF DALPAC-TYPE ANTIOXIDANTS

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Technology Newsletter

CHEMICAL WEEK
November 8, 1958

Additional light on high-energy fuels processing was shed at the dedication of the \$38-million borons fuel plant Callery Chemical is building for the Navy. Callery, incidentally, is optimistic that the final cost may be less than \$38 million.

Neither Callery nor the Navy is disposed to talk about the plant's products or processes. But some obvious facts emerged from the tour given the press: the first portion of the plant is just about complete; the second portion—where diborane is produced and formed into fuel—appears to require several months' more construction work.

When the plant is in operation, boric acid will be brought into the now-completed portion, reacted with methanol to form methyl borate. In an adjoining section, sodium will be treated with hydrogen to form sodium hydride. Then the methyl borate and sodium hydride will be reacted. One possible product of this step is sodium borohydride.

But evidence indicates that Callery won't make the borohydride More likely, it will make sodium trimethoxy borohydride. Herman Schlesinger and his colleagues, in their monumental work in this field (J.A.C.S. 75, 1953) showed how to make the compound this way, also how to use it to prepare diborane.

Just how Callery proposes to accomplish this last step is not clear. A boron halide is apparently not involved. But aluminum trichloride probably plays an important role—as it does in Olin Mathieson's completed plant (*CW Technology Newsletter*, May 24).

In any case, the diborane will be treated with ethylene made on the site (from methanol in a Foster Wheeler-built plant) and the product pyrolyzed to form tri-ethyl decaborane.

No figures on the capacity of the plant have been released. But it will probably be able to make 3 million lbs./year (using 300 days as the basis). This would make it just about six times as big as Olin Mathieson's interim plant, which, on a comparable basis, would be 480,000 lbs./year. And based on OM's scale-up figures (*CW Technology Newsletter*, July 13, '57), it would make the Callery plant bigger than the 2.2-million-lbs./year plant OM is putting up for the Air Force.

A point to remember, however: OM's plant, originally budgeted for \$36 million, is now quoted at \$45 million. It's likely that part of the extra money at least represents some additional capacity and that the Air Force plant will have at least as much capacity as the Navy's.

Fluorine's potential as a high-energy oxidizer for rocket fuels was underscored last week by John Sloop, chief of the Rocket Engine

Technology Newsletter

(Continued)

Branch, Propulsion Systems Division of the National Aeronautics and Space Administration, at the opening of Allied's new fluorine plant (*see p. 24*). Sloop predicted that with propellant systems using fluorine it may be feasible to send large missiles to the moon and probes to Mars and Venus. High-energy liquid propellents, he added, could permit an eightfold increase of payload with the same take-off systems used with today's propellents.

NASA has been experimenting with fluorine at its Lewis Laboratories since '49. First effort was with a small engine. Late last year, NASA put in a \$2.5-million test site for work with high-energy propellents (including fluorine). The agency can now handle engines of up to 26,000-lbs. thrust (large enough for some upper-stage rockets) and it is currently adding still more facilities at Lewis.

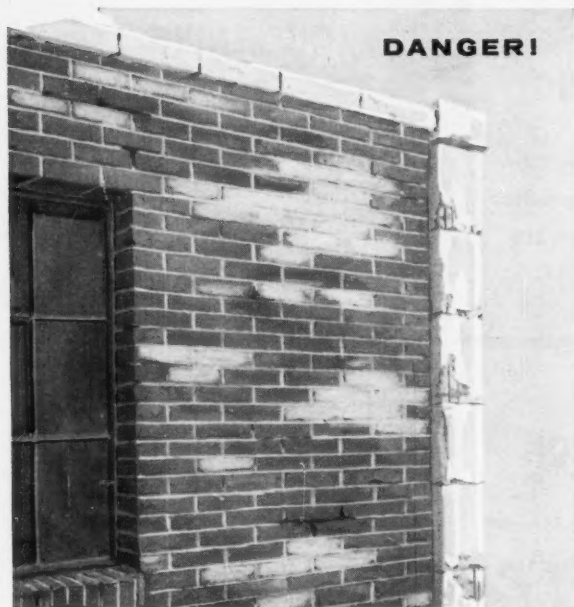
Liquid fluorine from the new Allied plant will be shipped by truck to North American Aviation (California), Bell Aircraft (Buffalo, N.Y.), Cal Tech's jet propulsion lab, as well as to Lewis labs. Plant has a capacity of 364 lbs./hour of fluorine—of which 300 lbs./hour will be required for uranium processing when uranium hexafluoride production gets under way. Extra cells may be added later to boost capacity to 550 lbs./hour, providing some 250 lbs./hour for fuel demands.

Allied has contracted to make 5,000 tons/year of hexafluoride for AEC for five years, starting April 1, '59. The company expects to begin shakedown operations about mid-January on a new all-fluidized reaction process developed by Argonne National Laboratory. The key steps: fluidized reduction of uranium oxide concentrate (U_3O_8) with hydrogen to produce uranium dioxide; fluidized hydrofluorination of the dioxide to uranium tetrafluoride (green salt); fluidized fluorination of the tetrafluoride to hexafluoride. The process eliminates conventional purification by solvent extraction of nitric acid solutions, instead will remove impurities by distillation of the hexafluoride.

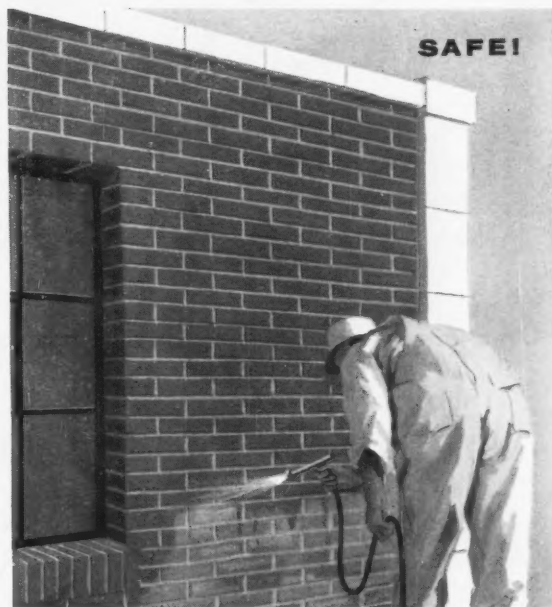
A new process for multicolor dyeing of fiber-glass fabrics, said to produce unusual texture and pattern effects on 100% of the fabric, has been developed by Hess, Goldsmith & Co. of Burlington Industries, Inc. William Colton, the firm's vice-president, says the process is an "important decorative breakthrough" in this type of fabric, which so far has been produced only in a few solid colors and prints. Patents are pending on process and products, which will carry a Dy-Cor trademark.

A new oral diabetes drug, claimed superior to others in use, has been developed by Nordmark-Werke GmbH. (Hamburg, Germany). The compound, *p*-chlorobenzensulfonyl-carbamide methyl ester, is chemically related to both tolbutamide (Upjohn's Orinase) and chlorpropamide (Pfizer's Diabinese).

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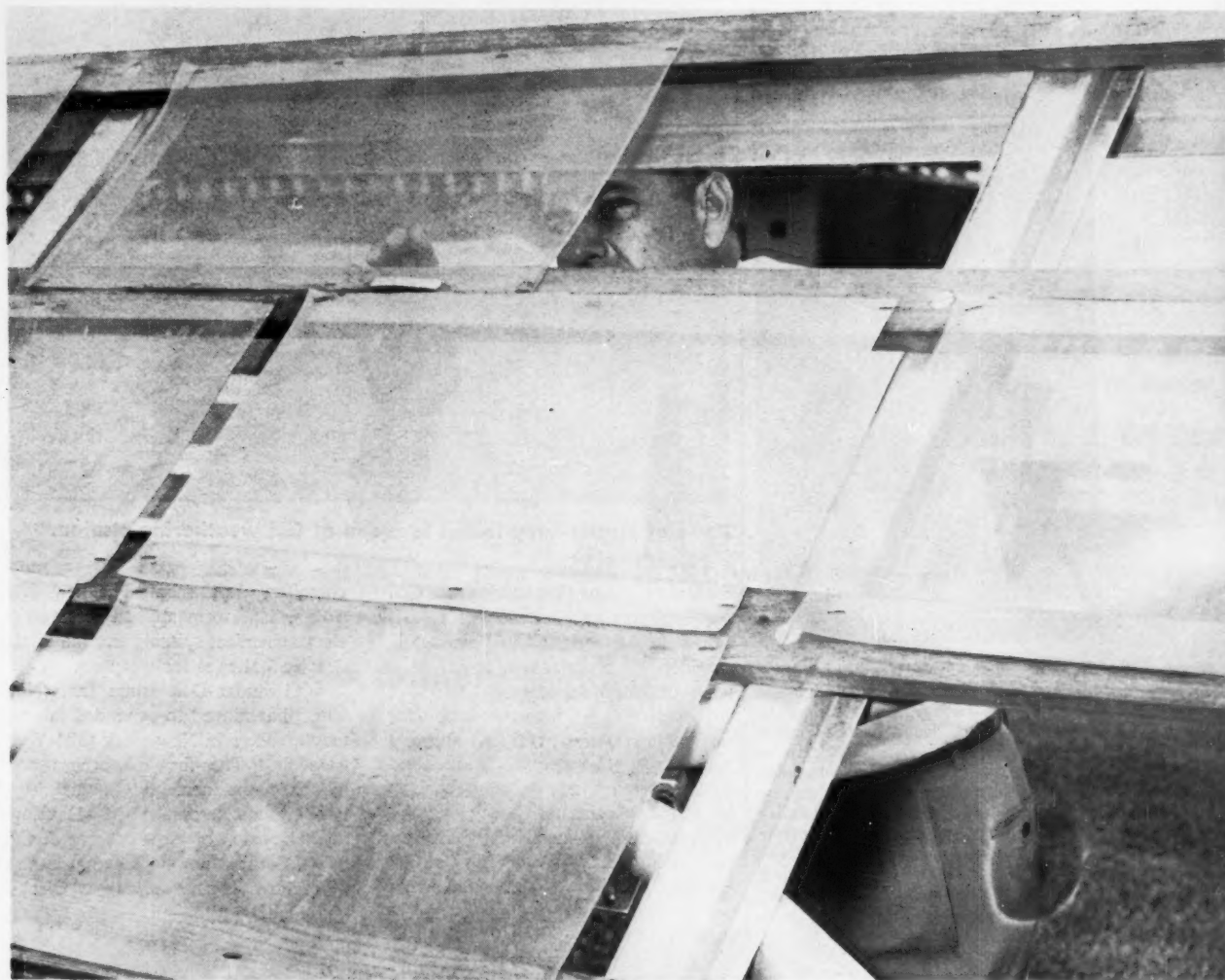
SYLOID 255

SYLOID 308

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SYLOID 978

RESEARCH



Test-field manager William Laesch inspects weathering of plastic rear windows for GM convertibles.

Keeping a Weather Eye on New Auto Parts

Paints, plastics, fabrics, and a myriad of other materials aspiring to automotive industry use come up against a new obstacle course this week in the shape of General Motors' just-unveiled testing facility near Miami, Fla. GM calls it "the most completely outfitted weathering station in the auto industry."

On the 10-acre site are 750 lineal ft. of aluminum exposure racks, 10,000 sq. ft. of building space (part of which is for a laboratory and an instrumentation room).

The station's laboratory allows GM to do on-the-spot research as well as

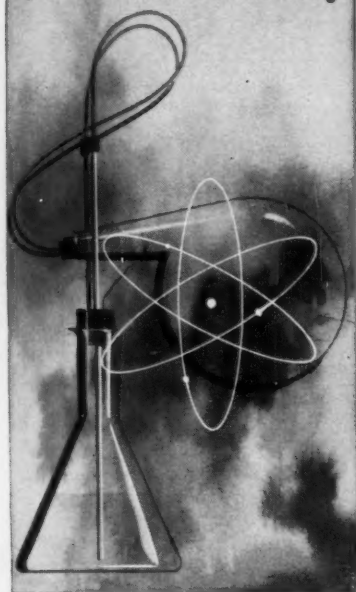
capitalize on the rapid weathering Florida climate provides. Ralph Wirshing, head of GM's research laboratories' chemistry department, which operates the facility, says the station has four assignments: to serve as a proving ground for ideas or theories; to implement the chemistry department's program of finding and developing new materials; to help in modifying and improving materials now in use; to provide a quality-control checkpoint.

Wirshing, who started GM's first Florida test field in 1930 using three exposure racks, originally worked only

with auto paints and finishes. Now, finishes account for only a small part of the test field's work load (expected to approximate 25,000 tests annually).

At the field, managed by William Laesch, exposure racks are decked with samples of upholstery fabrics, plastic and rubber moldings, steering wheels, tail-lamp lenses and virtually every automotive part that is subject to weathering. Samples come from most of GM's 44 operating divisions and subsidiaries, including General Motors of Canada, Ltd., and German, British, South African, Australian and other GM overseas units. Experi-

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RESEARCH



Rows of plastic lamp lenses face sun at GM weathering station.

mental or production items from GM suppliers are also tested. But GM is primarily interested in evaluating products or processes in research or early development stages.

Florida is a favorite state for weathering stations for government and industrial research. Paint and dyestuff researchers, particularly, lean on actual weathering data to supplement sometimes inconclusive laboratory weathering or fading studies. For example, the Navy's Bureau of Aeronautics has a paint-testing station at Fisher's Island in Miami.

Amid these weathering facilities, the elaborate instrumentation and other features of GM's new station (e.g., racks can be stored quickly in advance of hurricanes) set a new note of sophistication in environmental testing.

EXPANSION

- Esso Petroleum Co. Ltd. (London) has opened a \$2.8-million research laboratory near Abington, Berkshire, England. It will also be the research arm of other Esso companies in Europe and North Africa.

- Air Reduction Co. (New York) has completed a new two-story polymer laboratory at the firm's research and development center (Murray Hill, N. J.). Cost: \$500,000.

- U. S. Naval Ordnance Laboratory (Silver Spring, Md.) has formed an electrochemistry division in its

chemistry department. The new division will perform applied research in electrochemical systems and materials, develop batteries for weapons.

- Givaudan-Delawanna Inc. (New York) has moved to expanded laboratory quarters in New York (321 West 44th St.). The firm researches cosmetics, soaps, aerosols.

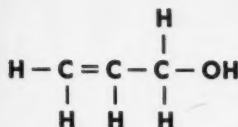
- Grace Research and Development Division of W. R. Grace & Co. (New York) is now occupying its new \$5-million research center at Clarks-ville, Md.

PRODUCTS

Fluoroalcohols: Du Pont has introduced three new fluoroalcohols identified as C7, C9, and C11, having a fluorine content varying from 68.6 to 71.4%. They reportedly have potential uses in producing high-fluorine-content organic intermediates for pharmaceuticals, dyes, surface-active agents, plastics, elastomers and lubricants. Development price: \$40/lb.

- **Granular Metasilicate:** Cowles Chemical Co. (Cleveland) is out with a beadlike granular form of sodium metasilicate pentahydrate. It is used as a base for cleaning compounds, in paper mills and for textile finishing. The compound was previously available in crystal form. In its new form, it is said to have better flow, easier compounding properties.

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Alkyl halides • Amines
Aromatic hydrocarbons
Halogens • Ketones
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Specification

Assay, minimum.....98.0%
Distillation range at
760 mm. Hg, IBP-DP.....95.0-98.0°C.
Specific gravity at 25/25°C.....0.849-0.852
Specific gravity at 20/20°C.....0.852-0.855
Water, maximum.....0.3%
APHA color, maximum.....15

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RESEARCH



Varian's Shooley and Johnson show new NMR spectrometer.

NMR—New Analytical Tricks

This week, U.S. and foreign scientists who attended Varian Associates' (Palo Alto, Calif.) recent "workshop" on nuclear magnetic resonance (NMR) are homeward bound with some new ideas on using the principle in chemical research. At the meeting, they heard Varian chemists James Shooley and Roy Johnson explain NMR's latest achievements in probing structures of steroids, alkaloids, borane fuels, polymers.

Shooley believes the latest NMR instruments (*CW*, March 8, p. 51) are particularly valuable in unraveling steroid structures. "The NMR method may be unrivaled," he says, "as a means of determining the number of methyl groups and to some extent their position on the steroid framework." This is particularly true for compounds such as sapogenins, in the 300-500-molecular-weight range. Significance: insight into steroid structures may help turn up new drugs of this type, which currently enjoy an estimated \$80-million market.

Varian chemists have also elucidated the structure of lunacrine, an alkaloid, and have found out more about how other organics are put together. For example, analysis of borane fuels is difficult when infrared

instruments are used, relatively simple with NMR. Similarly, NMR may become the standard analytical tool for fluorocarbons because fluorine has ideal nuclear properties.

A newly developed accessory for its NMR instruments enables Varian to analyze polymers at high temperatures (200 C), opening the door to the use of NMR in quality control. Polymers that are solid at room temperatures must be heated to obtain sufficient molecular motion for NMR analysis.

One thing holding up speedy industry adoption of NMR instruments is the dearth of reference spectrum curves of chemical compounds. Infrared instruments, in use for a much longer time, don't have this handicap. But Varian feels that NMR's popularity will jump as the numbers of reference curves increase.

A new text,* scheduled for publication in January, calls NMR's discovery "one of the most important events in the last 50 years in the advancement of organic chemistry." Varian's recent visitors are inclined to agree.

*"Nuclear Magnetic Resonance," by John D. Roberts, professor of organic chemistry, California Institute of Technology, published by McGraw-Hill. Probable price: \$5.50.

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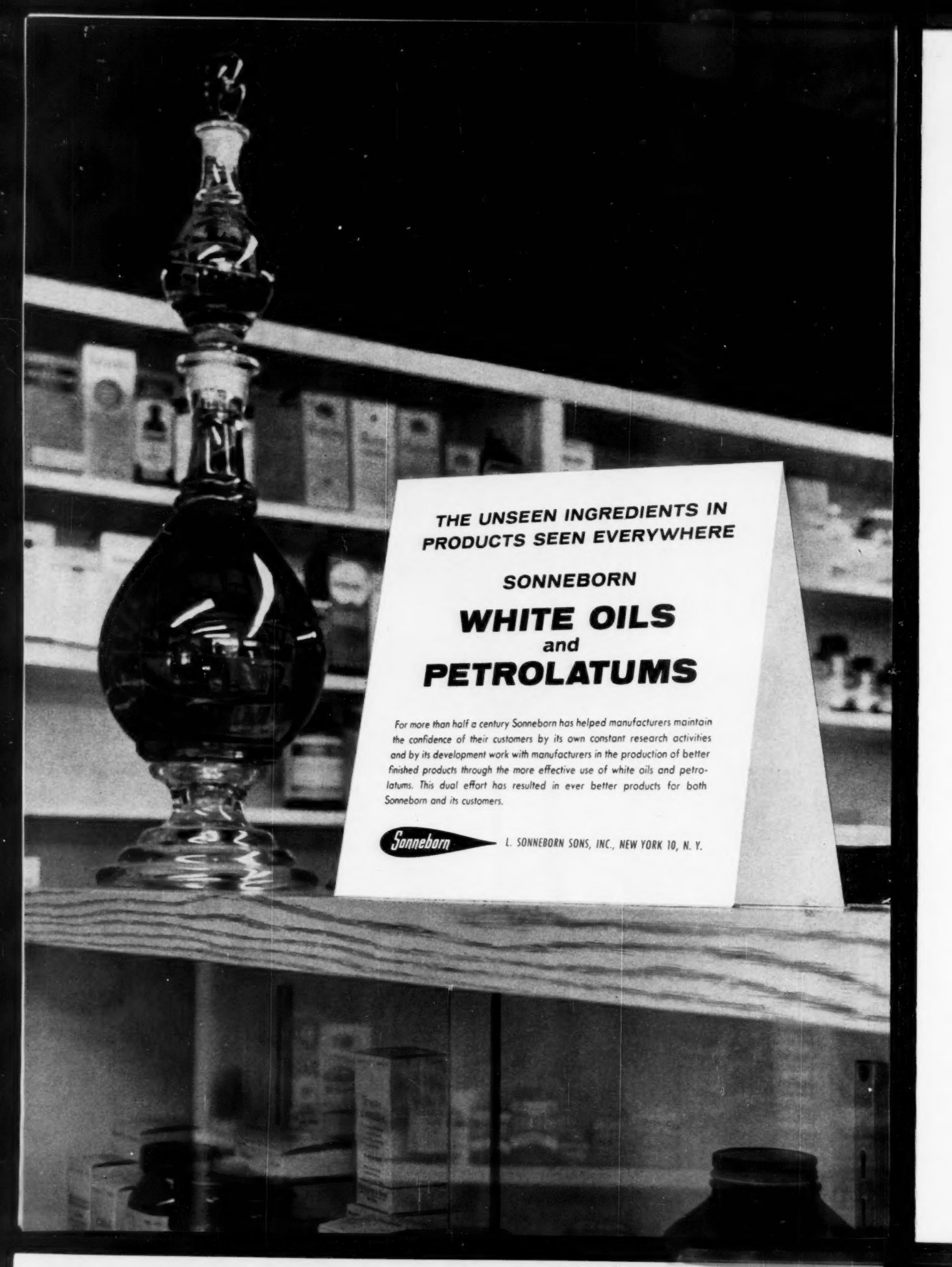
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Market Newsletter

CHEMICAL WEEK
November 8, 1958

Price hikes on major copper chemicals are now extended virtually across-the-board by a $1\frac{1}{2}$ ¢/lb. increase on black copper oxide. This boost follows similar increases on copper sulfate and copper oxides—all spurred by a recent hike in cost of the metal.

New quotes for bulk quantities include: copper sulfate, 11.65¢/lb.; cupric chloride, $43\frac{1}{4}$ ¢/lb.; cuprous chloride, 38.55¢/lb.; black copper oxide, $44\frac{1}{4}$ ¢/lb.

Price of copper cyanide hasn't been upped yet—and probably won't be. Reason: U.S.-made cyanide is now facing considerable competition from imports.

Immediately following the price increase on copper sulfate, Republic Chemical reassured its customers that it stands firm on its recently instituted plan to stabilize—for 12 months—contract prices on copper chemicals, regardless of other companies' price increases (*CW Market Newsletter*, Sept. 27).

Substantial price reductions on two phosphate insecticides are posted by Monsanto. Tabs on ethyl parathion (tradenamed Niran) and methyl parathion are cut 38% and 25%, respectively, to 84¢/lb.

Rapidly expanding use of methyl parathion is one reason given for the cut. Sales of the insecticide (used largely against cotton boll weevil) have climbed to an estimated 4.5 million lbs./year since it was introduced commercially in '55.

Synthetic USP phenol tags are down $\frac{3}{4}$ ¢/lb.; the Dow move sets the "effective immediately" price at $17\frac{1}{2}$ ¢. The cut, says Dow, was made to support and encourage the long-term growth of the intermediate. Synthetic phenol consumption has more than doubled in the past decade, but expanding U.S. capacity has more than matched the increase. Total capacity at present: about 700 million lbs./year.

Price of glacial acrylic acid is cut more than 40%, from \$1.15/lb. to 65¢/lb. (drum lots, less than carloads) by Rohm & Haas. Corresponding reductions also apply to less than drum lots.

Reason given for the price reduction: encouraging new application and development studies. There's a good chance, however, that it may also reflect increasing availability of the material—such as B. F. Goodrich Chemical's new glacial acrylic unit that went onstream last summer (*CW Market Newsletter*, Aug. 16).

Lithium prospects are less than bright. This fact is underscored by Foote Mineral's note to shareholders, sent out last week, that says "the

Market

Newsletter

(Continued)

present industrial markets for lithium hydroxide, while growing at a reasonable rate, do not justify full-capacity operation of our lithium facilities. Consequently, we anticipate that it will be necessary to reduce the rate of production in the summer of 1959."

For several years, Foote Mineral has been supplying the Atomic Energy Commission with a portion of AEC's requirements of lithium hydroxide. These deliveries will be completed by May 1, '59, and negotiations for further supplies are unlikely.

Last week, there was another hint of problems in the lithium business. Predictions of drastic reductions in automotive grease consumption in the years ahead (*CW Market Newsletter*, Nov. 1)—if they prove accurate—spell trouble for an important lithium market, lithium greases.

•
In the face of bitter West Coast ammonia competition, Standard Oil Co. of California this week is gearing up operations at its Richmond, Calif., facility. (Output is bought and marketed by its subsidiary, California Spray Chemical.)

SoCal reports it expects complete work on its plant in early '59. Improvements will boost, by 30 tons/day, the plant's present capacity of about 300 tons/day. Streamlining will bring the plant to "optimum capacity," increase efficiency.

Meanwhile, another California ammonia maker is pondering expansion. Collier Carbon & Chemical (Brea, Calif.) is doing an "engineering evaluation" for possible expansion of its Brea ammonia plant. No official figures are available, but trade reports peg the increase at about 80 tons/day—up one-third from the present 250 tons/day.

Collier admits that the recent ammonia price cut by Shell (*CW Market Newsletter*, Nov. 1) is a strong new factor to consider, but the company intends to continue with the expansion study at least.

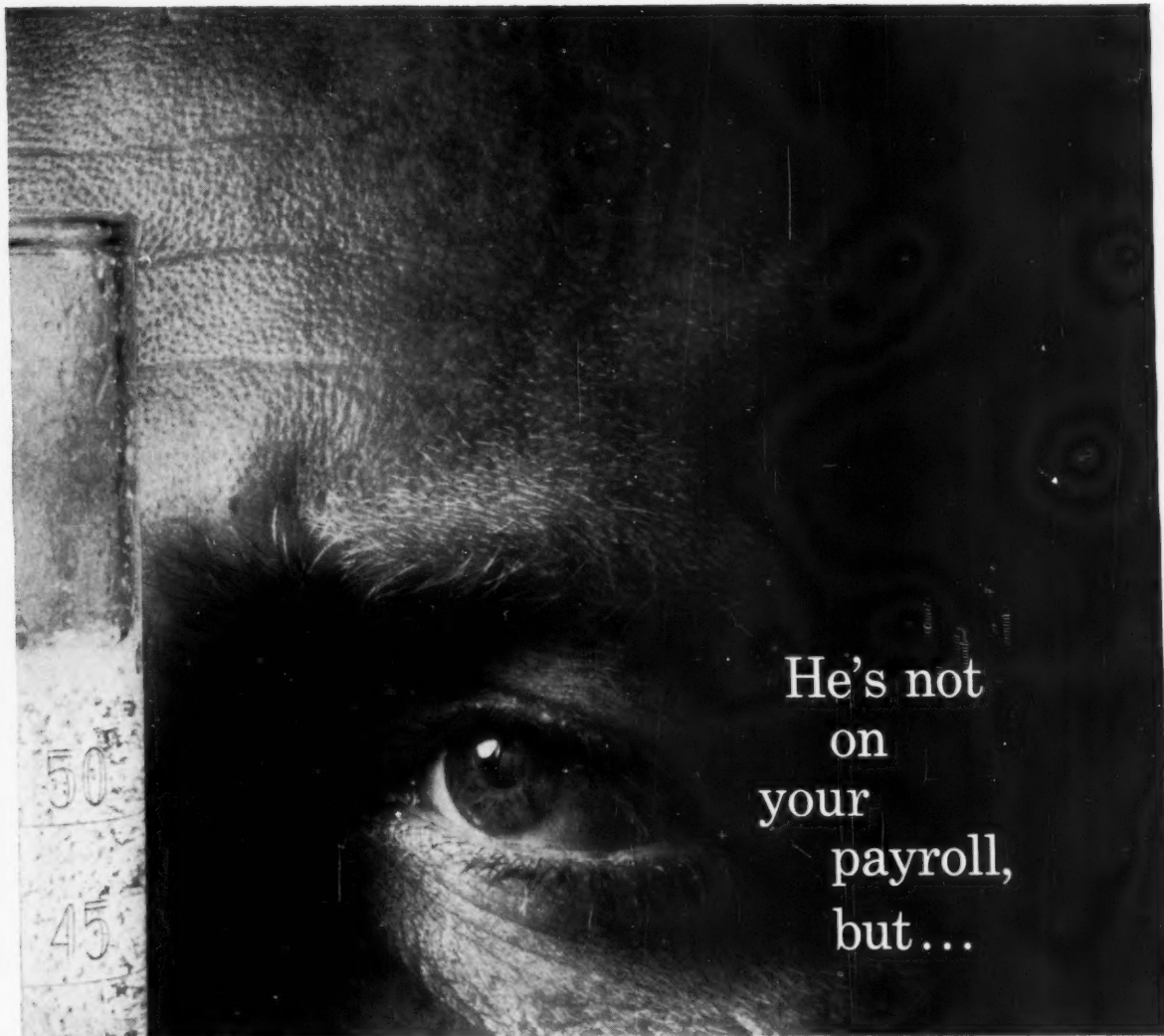
•
Long-range outlook for pesticides is bright. So said National Agricultural Chemicals Assn. President J. R. (Jack) Vernon at the group's silver anniversary meeting in Savannah, Ga., last week. His prediction: farm pesticides sales will top \$1 billion by '75.

•
Enjay has adopted Escon as trademark for worldwide marketing of polypropylene.

SELECTED PRICE CHANGES — WEEK ENDING NOVEMBER 3, 1958

	Change	New Price
DOWN		
m-Chloroaniline, dms., c.l., frt. alld.	\$0.03	\$0.75
Mercury metal, 76-lb./flask, net flask	1.00	231.00
Phenol, synthetic, USP, tanks	0.0075	0.1750
Citral, extra, bots.	0.50	4.35

All prices per pound unless quantity is stated.



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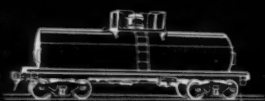
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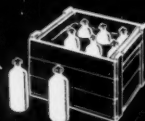
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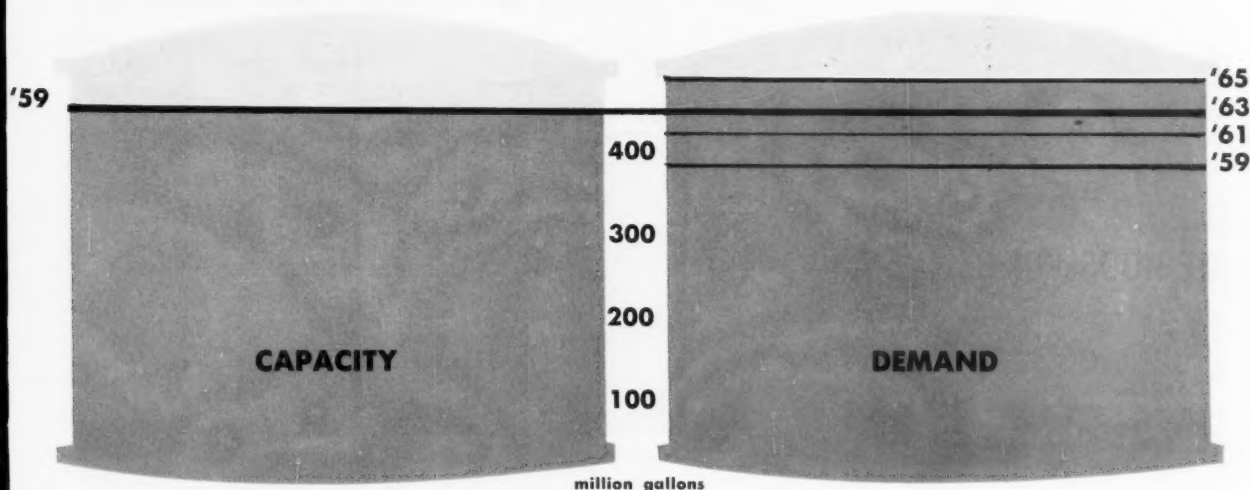


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Benzene Capacity's Four-Year Headstart



Overcapacity, Imports Burden Benzene

The U.S. will have some 80 million gal./year of benzene overcapacity by '59, when the last of the current string of new plants goes onstream. Even if benzene imports are curbed—extremely improbable—experts are now estimating demand won't begin to catch up with '59 capacity until '63 at the earliest.

How did the benzene industry get into this predicament? Three major reasons are: overoptimistic long-range estimations of benzene demand; the petroleum industry's eagerness to capture a larger share of the total market; the demand-retarding effects of the recession.

What can be done? Apparently not much, except to revise demand forecasts and wait for '63.

One More Coming: The big '58 surge in U.S. benzene capacity began early this year when Humble Oil put a new 30-million-gal./year plant onstream at Baytown, Tex. Next, in early summer, were Richfield Oil's 18-million-gal./year unit at Watson, Calif., and Vickers Chemical's \$3.5-million (capacity not revealed) plant at Potwin, Kan.

Last to arrive—probably in mid-summer of '59—will be Gulf Oil's 30-million-gal./year installation at

Port Arthur, Tex. The unit was originally slated for completion late this year, but has been delayed by a construction strike.

The first three plants added burdens to a benzene market that had already been sluggish for a long time.

Benzene producers had doggedly maintained prices at 36¢/gal. for more than three and a half years. Last summer, the industry was reluctantly led into a 5¢/gal. price cut by a Texas oil company (*CW Market Newsletter*, July 19), although there was little hope that the move would stimulate sales. Some firms argued against the cut, claiming there simply wasn't a market for more benzene, that the cut would not be enough to effectively combat imported material.

Events since then have apparently confirmed fears of the doubters, although industry reports now indicate a slight pickup in sales in recent weeks (*CW Market Newsletter*, Oct. 18).

And new suggestions that a second price cut might do the trick are getting a cold reception from most producers, who say it wouldn't do any more good than the first slash.

Import Impact: Troubles of the benzene industry are frequently blamed on the high volume of im-

ported material, mainly from Communist countries. Admittedly, imports take a sizable share of the benzene market that U.S. producers can easily supply.

But imports are only one facet of the general oversupply problem, and there is little evidence of desire to fight imports—by pushing for tariff protection, for example. One reason: most of the foreign material goes to one buyer, little gets into the open market. Petroleum companies that produce benzene have another reason: "We are free-traders ourselves."

Gauging benzene imports is difficult because year-to-year shipments have been very erratic, provide a poor base on which to establish trends.

Hence, the industry forecast that 50 million gal./year of foreign benzene will continue to pour into the U.S. at least until '65 (see chart, p. 90) is, at best, only an educated guess.

Total U.S. benzene imports in '55 amounted to just over 32 million gal.; in '56, volume leaped to a record 69.5 million gal.; in '57, fell off to 55.3 million gal.

A total of 18.8 million gal. were imported in the first five months of '58 (8 million gal. from Russia, 891,-



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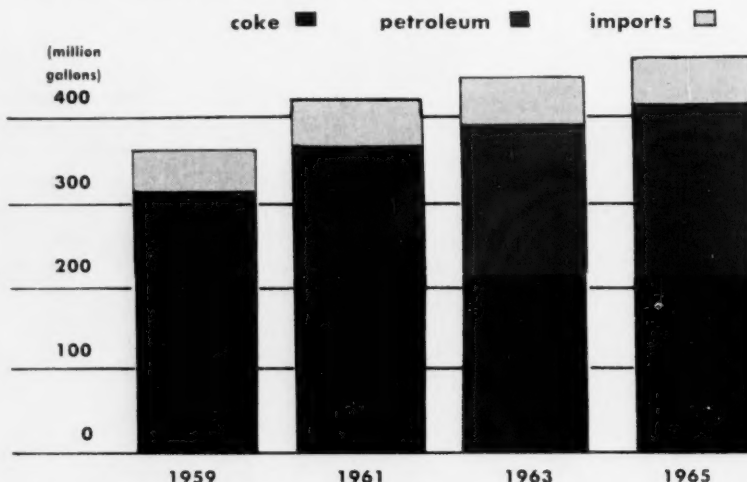
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U. S. Benzene Sources



511 from Poland, 9.9 million from West Germany). Projection of this total (only official data yet available) into a forecast of, say, 45-50 million gal. in the full year might be misleading because of the unevenness of monthly shipments. For example, in the first three months of '58, imports were about 1.6 million gal., 2.7 million, and 3.5 million, respectively. None was received during April, but an 11-million-gal. flood followed in May.

Here's the source breakdown of annual U.S. benzene imports in '56, showing a major part originating in Communist countries: Russia supplied almost 39.8 million gal.; Poland, more than 19.6 million; Czechoslovakia, 790,918; East Germany, 257,272. A total of 9.1 million gal. came from Canada, West Germany and the Netherlands.

France and Germany dropped out as suppliers in '57; in the first half of '58, only Russia, Poland and West Germany shipped benzene to the U.S.

Forecasts Revised: Until recently, benzene marketers were forecasting that demand will be in excess of 500 million gal./year by '65; now, reappraising the situation, many are convinced that a downward revision is in order. Consequently, the current, more conservative estimate of '65 benzene demand—with which many

market followers agree—is about 475 million gal.

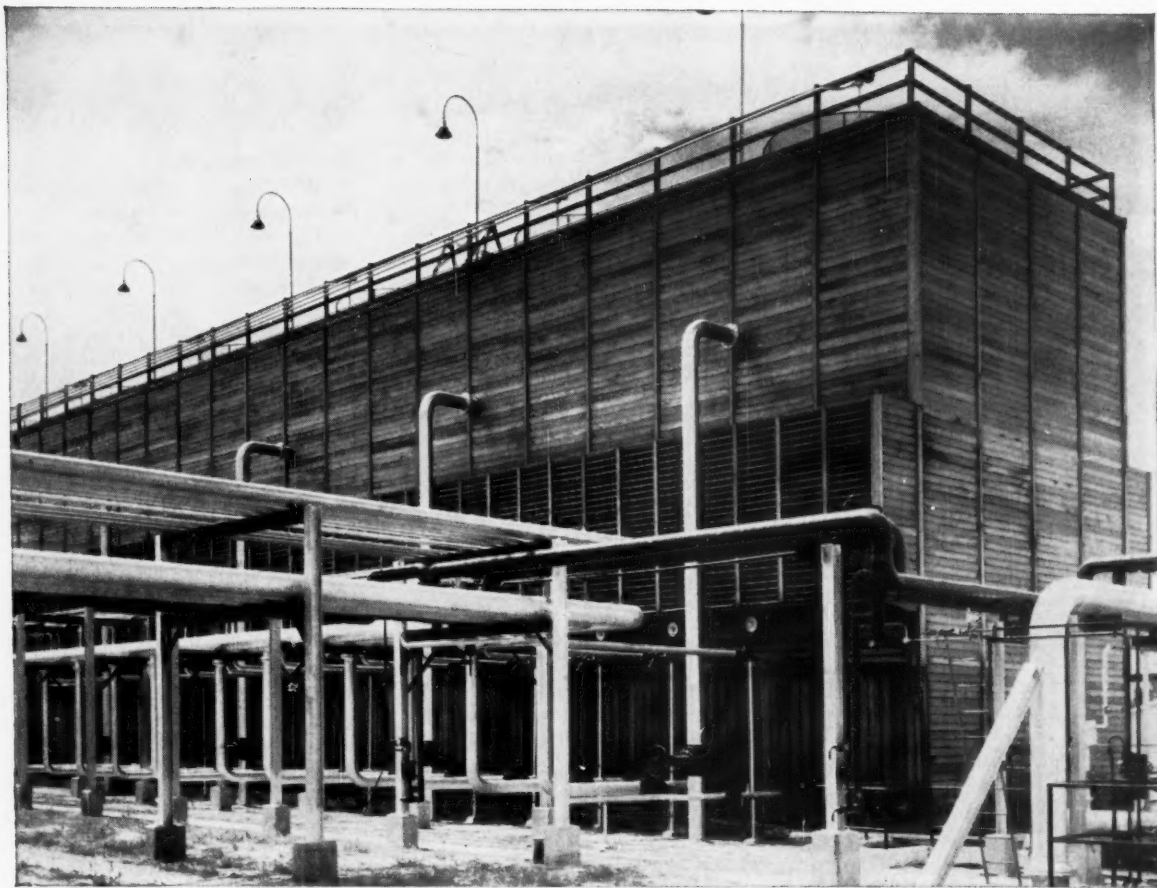
But not all observers go along completely with that estimate. Viewpoints differ, largely because of the difficulty of interpreting requirements of benzene-consuming industries.

What, for example, will happen to U.S. exports of synthetic rubber as foreign countries expand their own facilities? Some marketers in this country aver that the rubber export business won't be as good in the years ahead as some producers and exporters would like it.

Moreover, the future of polystyrene markets—although growing—will be affected by competing materials, notably polyethylene, probably polypropylene.

And, while there may be agreement about the potential size of a consuming industry, the benzene demand that it represents may be interpreted differently. Variations in technological processes, for example, prompt the use of different unit consumption factors to relate raw materials needs to production of final products.

Another case where process change can influence benzene's future is in manufacture of nylon. One estimate—which recognizes that benzene provides only part of intermediate cyclohexane—puts '65 benzene demand for nylon at 60 million gal. Other ob-



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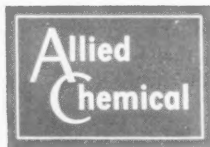
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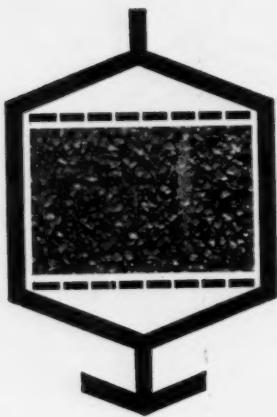
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servers weigh the split raw-materials situation differently, come up with an estimate that only 30 million gal. of benzene will be needed for nylon manufacture in '65.

Clearly, no one end-use breakdown would be agreed upon by all market observers. But consensus of benzene market researchers points to this approximate benzene market pattern for '65:

Benzene End-Use Demand in '65 (million gallons, estimated)

Styrene	185
Phenol	85
Nylon	30
Detergent alkylate (dodecylbenzene)	50
Misc.	125
Total	475

General belief is that 185 million gal./year of benzene for making styrene is a conservative estimate of demand by '65, but some nonetheless consider it optimistic.

A host of end-uses, are included in the miscellaneous category, e.g., maleic anhydride, aniline, nitrobenzene, DDT and BHC insecticides. One "conservative" outlook pinpoints the '68 benzene market for these items as follows: aniline, about 20 million gal.; DDT, 10-20 million; di- and monochlorobenzene, 10-15 million; maleic anhydride, 20 million.

It's apparent that the benzene market picture won't clear up for some time, that producers will have to hustle to get a reasonable share of the market—limited in relation to total capacity.

The situation was summed up this way recently by Esso's Vice-President O. V. Tracy at a meeting of the American Coke and Coal Chemicals Institute at White Sulphur Springs, W.Va.: Steelmakers, coke-oven operators, and everyone else in the aromatics business, know that aggregate capacity—that is, aromatic capacity from both coal and oil—has outrun demand. They realize that quality standards are exacting now and are going to stay that way. And, finally, they know that chemical customers shop around, testing out various suppliers both at home and abroad. Real dynamic change is taking place in this field, which is achieving greater importance each year.

Chinese Rosin Coup

China may soon sink U.S. gum naval stores export markets through cut-rate selling on world markets.

Last week, H. L. Meyer, of Chematar Pine Products Corp., painted a grim picture of the chances U. S. naval stores exports face. He was one of the main speakers at the National Paint, Varnish & Lacquer Assn. convention in Washington, D.C.

China, he said, would produce at least 100,000 tons of gum rosin and 25,000 tons of gum turpentine in '58; at least 25% of total production will be available for export to western Europe.

China has indicated it can supply 12-15,000 tons of gum rosin to the United Kingdom, in fact has already sold most of that amount. Meanwhile, Spain has issued export licenses for nearly 15,000 tons of U.K.-bound rosin, of which 10,000 tons have already been sold.

These shipments of 27-30,000 tons of gum rosin from these two sources would leave a further demand of only 12-15,000 tons from other producing countries, i.e., Portugal, Greece and the U.S. Considering that these three countries last year shipped 33,000 tons of gum rosin to the U.K., its obvious, says Meyer, that "somebody is going to get hurt."

Although U.S. gum exports will likely be cut sharply, it doesn't mean that producers will be left with surplus material. The U.S. crop has declined to such an extent that nearly all production is being absorbed by the domestic market and by some exports. A small surplus goes into government loan programs. Hence, the situation at this time isn't as bad as it seems, says Meyer.

But what will happen if the government support program for gum naval stores is discontinued? It may be difficult, Meyer says, for manufacturers to reduce their production costs; equally difficult to reduce their processing costs significantly; impossible to reduce the cost of marketing, which is not even sufficiently covered by present margins.

Provisions of the Naval Stores Act, which now prohibit the mixing of different types of rosin, says Meyer, should be amended. If that is done, he concludes, "our export problems may be solved."



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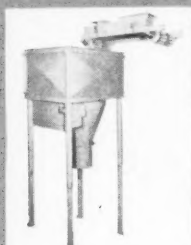
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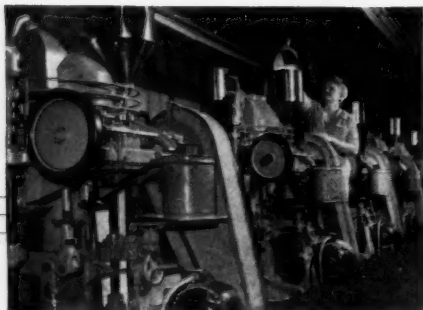
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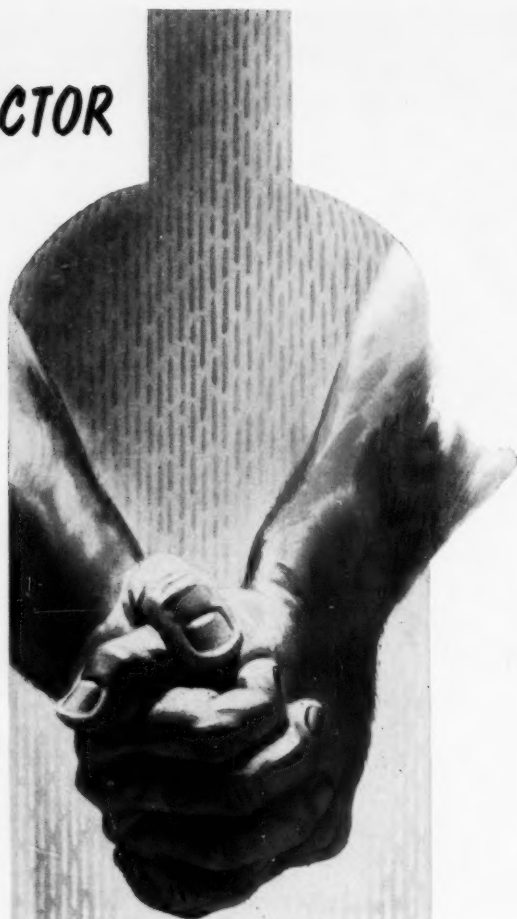
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SKETCH BY FRED LUPOLI

'Give-and-take' conferences may be key to better understanding between U.S. and foreign businessmen.

Talking Out Their Foreign Trade Problems

An old-fashioned no-holds-barred discussion is proving to be a new tool for promoting better understanding between U.S. and Latin American businessmen. Model for such conferences might well be one recently held by Rayonier Inc.

At the conference in Rio de Janeiro, Brazil, Rayonier's Latin American customers and prospects aired their grievances on a broad range of business, political and international subjects.

Result, according to opinions shared last week by Rayonier management and industry observers, was a better understanding of the problems faced by businessmen on both sides of the border. They agree that the frank, give-and-take exchanges of "gripes and criticisms" should certainly lead to greater cooperation, to more profits for U.S. firms.

Stefan Rundt, New York consultant on international business, addressed the conference. He says that U.S. chemical companies, because of

their role as raw materials suppliers, are particularly suited to this type of meeting. The chemical company, as did Rayonier, can remain somewhat aloof, playing the host and moderator, while urging its foreign customers and prospects to discuss freely those business problems found largely in the realm of the end-product maker or the local manufacturer, he said.

Conference Purpose: Rayonier's conference, attended by a half dozen of the company's management and 27 of its customers and prospects from all over Latin America, took place Oct. 8-9 at Rio's Copacabana Palace Hotel. Its original purpose, according to R. L. Plummer, Rayonier's export sales manager, who — along with General Sales Manager M. A. Brown—conceived and executed the meeting, was to pass along to the participants information on rayon developments and general business conditions.

"We made no effort to sell Rayon-

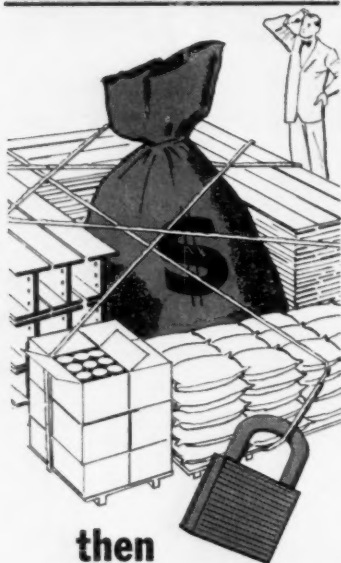
ier," Plummer says. "We knew from experience that our customers were anxious to hear of recent rayon developments and to learn of business conditions outside their own countries. In addition, we knew that in many instances customers operating the same towns didn't know each other."

Outsiders Spoke: Rayonier invited two "neutral" speakers to address the meeting—a non-American nation was represented and viewpoints totally disconnected from Rayonier operations were presented.

During the first afternoon of the conference, M. Jean De Precigout, president of the International Committee for Rayon and Synthetic Fibers (Paris), talked about the world's rayon industry.

The following day, Rundt commented pro and con about the U.S. and Latin America. His comments set the stage for an open forum in which the businessmen discussed most every subject without reservation. All

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agreed that the forum was the key feature of the conference, led to wholesome air-clearing on both sides.

Feeling of Accomplishment: Rundt recently told a New York Board of Trade gathering that in his opinion "Yankee-Latino relations today are at their worst in recent history." He called the Rayonier conference "a practical, effective and easily emulated way to better relations."

Rayonier's tangible gains from the conference will be long-range at best, Plummer told *CW*. He added that the company had no hopes for immediate gains. "We wanted to get our customers and prospects thinking about quality cellulose pulp and rayon, particularly for use in tire yarn. A demand for quality rayon would create a demand in Latin America for quality cellulose pulp," he said.

"Actually," Plummer says, "before we can hope to increase our market in Latin America, several of the countries, particularly Argentina and Brazil, must improve their hard (dollar) currency exchange positions. Those countries with a dollar shortage are forced to buy their cellulose pulp from soft currency areas such as Scandinavia."

Rayonier has shown the way to better understanding among its Latin American customers. "What they elect to do is up to them," says Plummer.

'Don't Slight the Pros'

Engineers, scientists and other professional employees may move quickly to unionism if management doesn't recognize more strongly the distinctions between them and nonprofessionals. So warned Clark Dunn, president of the 46,000-member National Society of Professional Engineers, at the society's fall meeting in San Francisco a few days ago.

Dunn, who is also the executive director of the Office of Engineering Research at Oklahoma State University, said that "misguided neutrality on the part of industrial management regarding the unionization of engineers could result in a complete breakdown of the concept of professionalism in industry."

He claims that management, by assuming a neutral attitude toward professionals when faced with a representation election among engineer-

ing employees, is actually abdicating its responsibility to preserve the distinction between professional and non-professional services. He points out that as graduate degrees and university-level training become even more necessary for engineers in industry and government, management and government officials "must realize that the interests of these employees—and the interests of progress and achievement—are not adequately served by membership in a labor union."

To illustrate, Dunn cited this situation: A small group of professional employees in an aircraft plant voted by a thin margin to be represented by the same union that represented several thousand engineers and technicians in the company's main plant at another location. The union's contact with management prior to the election disclosed that the company's attitude was one of neutrality. This attitude, says Dunn, made it almost impossible for anybody to use company channels to advise the engineers about unionism prior to their vote.

Seeks Solution: Dunn feels that management might well reappraise its approach in its dealings with engineers. Dunn says that company executives like to tell themselves that engineers are part of the management group. But this, he says, is frequently not the case. He advises management to ponder seriously the question of whether its engineers are fully treated as management people.



NSPE's Dunn: 'Management's neutral stand is abdication of responsibility.'

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Patent Suits Settled

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Settlement completely exempts from any liability Pfizer's customers that use Pfizer's gluconic acid or sodium gluconate in formulations, methods or processes described in Diversey's U.S. Patents 2,615,846 and 2,584,017. Pfizer has also been granted a non-exclusive license under Diversey's U.S. Patent 2,650,875 covering methods of etching aluminum and aluminum-base alloys.

The litigation involved two lawsuits. In one, Diversey claimed Pfizer infringed Patent 2,615,846 covering methods of washing bottles. Both parties withdrew their petitions requesting review of the case by the U.S. Supreme Court. Pfizer agreed to dismissal of a second suit seeking a declaratory judgment that patent 2,584,017 relating to bottle-washing compositions was invalid. Both suits were terminated without further liability on the part of either party.

KEY CHANGES

James G. Fox, Jr., to executive vice-president and **J. Warren Carey** to vice-president, National Aniline Division, Allied Chemical Corp. (New York).

John D. Fennebresque to president, chief executive officer and board of directors, Texas Butadiene & Chemical Corp. (Houston).

Huger S. King to board of directors, Vick Chemical Co. (New York).

Ralph T. Ulrich to board of directors, Reichhold Chemicals, Inc. (White Plains, N. Y.).

Robert F. McClellan to vice-president, Nopco Chemical Co. (Newark, N.J.).

Hugo Riemer to executive vice-president and board of directors and **Norman Travis** to board of directors, United States Borax & Chemical Corp. (Los Angeles).

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George H. Richards, 57, senior vice-president and director, Celanese Corp. of America, at Montreal, Que.

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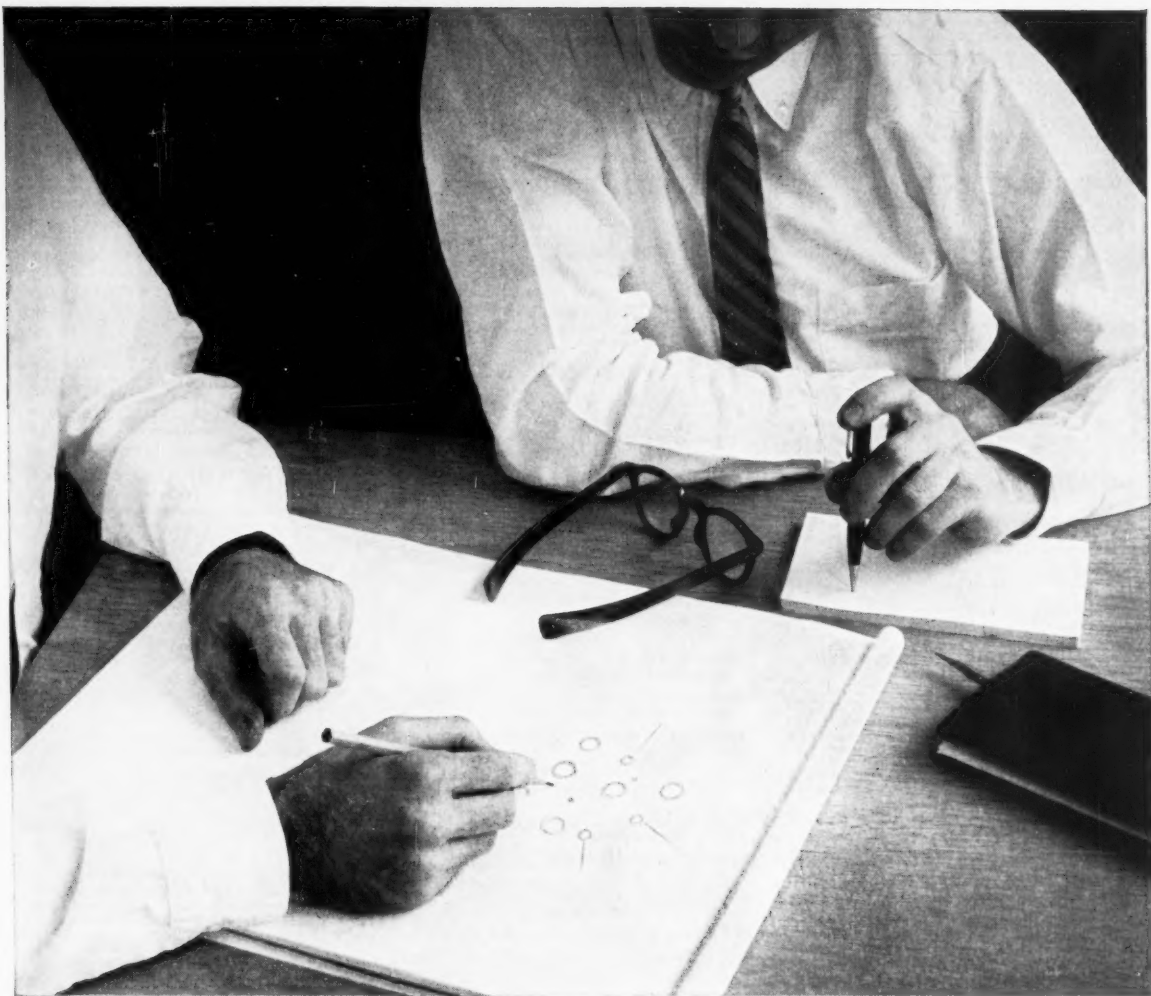
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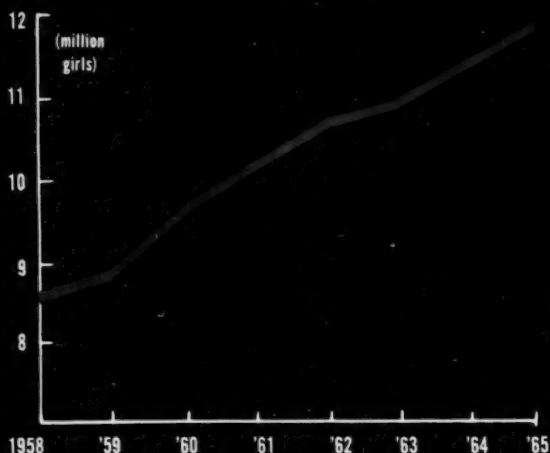
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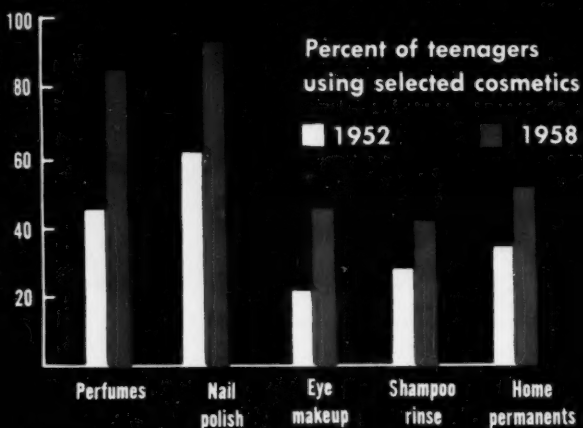
CHARTING BUSINESS

November 8, 1958 • Chemical Week

Growing numbers of teenage girls



Augur rising cosmetic sales



Seventeen Magazine.

ILLUSTRATION COURTESY NEW YORK HERALD TRIBUNE

Growing Up with Cosmetics

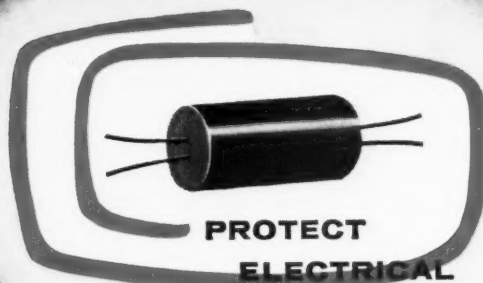
There will be some 12 million teenage girls in the U.S. by 1965, about 3 million more than this year. These young ladies represent a growing market for the domestic cosmetics industry—a market that is growing in number of customers and augmented by increased use per customer.

This trend is illustrated by the annual survey conducted by *Seventeen* magazine, showing percent increase of cosmetics used by teenagers. Some items, such as rouge, are little favored by girls under 20. But since '52, virtually every teenage girl in the U.S. has used lipstick.

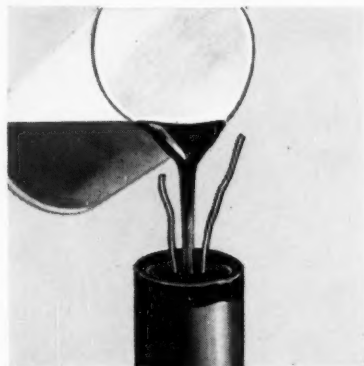


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